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FORTIFICATIONS APPROPRIATION BILL FISCAL YEAR 1921

HEARINGS

BEFORE THE

SUBCOMMITTEE OF HOUSE COMMITTEE ON APPROPRIATIONS

CONSISTING OF

**Messrs. C. BASCOM SLEMP (CHAIRMAN), BURTON L. FRENCH,
CHARLES F. OGDEN, JOHN J. EAGAN,
AND JOSEPH W. BYRNS**

IN CHARGE OF

THE FORTIFICATIONS APPROPRIATION BILL

SIXTY-SIXTH CONGRESS.

SECOND SESSION



**Sup. 1922
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**WASHINGTON
GOVERNMENT PRINTING OFFICE
1920**

DEFENSE APPROPRIATION BILL
FISCAL YEAR 1921

HEARINGS

BEFORE

SUBCOMMITTEE OF THE SENATE
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HOUSE OF REPRESENTATIVES.

COMMITTEE ON APPROPRIATIONS.

SUBCOMMITTEE ON FORTIFICATIONS APPROPRIATION BILL.

C. BASCOM SLEMP, *Chairman.*

BURTON L. FRENCH.

JOHN J. EAGAN.

CHARLES F. OGDEN.

JOSEPH W. BYRNS.

J. C. PUGH, *Assistant Clerk.*

FORTIFICATIONS APPROPRIATION BILL, FISCAL YEAR 1921.

HEARINGS CONDUCTED BY THE SUBCOMMITTEE (MESSRS. C. BASCOM SLEMP (CHAIRMAN), BURTON L. FRENCH, CHARLES F. OGDEN, JOHN J. EAGAN, AND JOSEPH W. BYRNS) OF THE COMMITTEE ON APPROPRIATIONS, HOUSE OF REPRESENTATIVES, IN CHARGE OF THE FORTIFICATIONS APPROPRIATION BILL, ON THE DAYS FOLLOWING, NAMELY:

MONDAY, MARCH 22, 1920.

FORTIFICATIONS IN UNITED STATES AND INSULAR POSSESSIONS.

STATEMENT OF MAJ. GEN. F. W. COE, CHIEF OF COAST ARTILLERY.

GENERAL STATEMENT.

Mr. SLEMP. I will say to the gentlemen of the committee that on March 2 I wrote to the Chief of Coast Artillery, suggesting that he make a general statement when he appeared before the committee with regard to the condition of our fortifications and the amount of money that has been expended in recent years, and any other general matters showing the condition of our seacoast defenses; and if it is agreeable to you, Gen. Coe, or any other representative of the War Department present, to make a general statement on those subjects I am sure the committee will be glad to hear from you.

Gen. COE. I am prepared to make a general statement such as you have suggested, Mr. Chairman.

I think it is perfectly evident that a consideration of the offensive and defensive power of naval fighting craft is a subject which is intimately connected with coast defense, and, therefore, with the provisions of the fortification bill. Consequently, I would like to present to the committee a brief statement of the most important and latest developments in battleships and to indicate how such developments affect the problem of the defense of this country. These developments may be conveniently considered under two heads: First, defensive arrangements, and, second, offensive power.

Defensive arrangements: The armor protection of battleships and battle cruisers has increased to a remarkable degree, due to the experiences of the war. There is no doubt, I think, that the superior armor protection of the German high-seas fleet at the battle of Jutland was an important factor in preventing the British grand fleet

from securing more decisive results. On the other hand, the deficiency in armor protection of certain vessels of the grand fleet is stated by Admiral Jellicoe to have been the cause of serious concern. It was actually necessary during the war to take stringent measures to correct this deficiency in the case of new battleships joining the fleet.

The latest type of battleship under construction by the British is the *Hood*. The design of this vessel was drawn subsequent to the Battle of Jutland and embodies unquestionably the lessons taught by the greatest sea fight of history. The side-armor protection of the *Hood* reaches a maximum of 15 inches, while the maximum deck protection is 8 inches. It is difficult to realize just what these figures indicate. They mean that the *Hood* is almost immune from serious damage by any gun constructed by the United States prior to the commencement of the war. No 12-inch gun in existence is a match for this armor. It is questionable whether the 12-inch mortar which attacks the most vulnerable portion of a naval target can, at its most effective range, assault successfully the vitals of such a vessel.

Offensive power: Together with the tremendous increase in armor protection, the *Hood* carries armament of sufficient power to attack successfully a vessel of her own class. At one time it was a question as to whether her armament should consist of six 18-inch or eight 15-inch guns. The decision in favor of the 15-inch was reached probably on account of the greater volume of fire. Exact data as to the extreme range which these 15-inch guns can attain on their ship mounts are not available, but it is probably not less than 20 miles. The Japanese have recently launched the battle cruiser *Nagato*, which will be provided with eight 16-inch guns, making it the most powerful battleship afloat to-day.

While these battleships are not yet actually in commission, I cannot help feeling that their existence is a matter of the greatest interest to this committee, for the acts of the committee can not be transformed into defensive power within a period of several years, and it seems necessary not only to take cognizance of existing war material, but to forecast future developments with as great accuracy as possible, in order that action commensurate with the future needs of the national defense may be taken.

Before taking up the question as to how coast defense fortifications are to meet these advances in naval construction, it is desirable to consider just what form of offensive action these tremendous naval agencies of destruction may take against land targets. It is necessary not to lose sight of this important fact—that all the ingenuities of the designers of warships are bent toward the production of the most effective type for the attack of and defense against other warships. The use of a warship for any other purpose will almost invariably be incidental. The possibilities, as well as the limitations of such incidental use, are what immediately concern the present discussion. There is no lesson of the war more emphatically demonstrated than the ineffectiveness of ship fire upon land defenses. The operations in the Dardanelles and those on the Belgian coast did not result in the destruction of the shore defenses. The advantages which a gun on shore has over one afloat remain to-day, as they always have, many times in favor of the former.

Mr. SLEMP. You have learned the same lesson from Heligoland.

Gen. COE. Heligoland was not brought under attack, but the Dardanelles and the Belgian coast were under attack for months.

Mr. SLEMP. I had in mind that the fortifications of Heligoland might have seemed too strong to be attacked.

Gen. COE. Possibly, yes.

Mr. SLEMP. And the same lesson was drawn from Port Arthur in the Russo-Japanese war.

Gen. COE. Yes, sir; the same. Some definite and vital object must be provided before ships will be brought against land fortifications. It may be stated that even with our present coast-defense armament, which is obsolescent, it will be sufficient to accomplish one of the purposes for which it was installed, namely, to prevent the occupation of harbors and the use of their facilities by a hostile force. Even vessels of the *Hood* type would hesitate to remain for a long period within the range of our present armament.

This present armament is, however, very limited in range, compared with the more modern types of weapons, and it is impossible for it to accomplish successfully the second mission of coast-defense fortifications, which is the protection from bombardment and destruction of important naval utilities and large centers of population. Against these targets the 15-inch guns of the battleship *Hood* could work devastation, while the battleship itself lay entirely beyond the range of the artillery installed at many of our naval bases.

That is to say, while naval guns may have a range of 40,000 or 50,000 yards, they can not successfully attack another naval vessel at that range; probably 25,000 yards is the extreme limit at which one ship will or can attack another; but with a tremendous target such a city like New York or a big target like a naval base——

Mr. SLEMP (interposing). General, how would any vessel conduct a successful offensive against a fortification when that vessel, say, is 40,000 yards away, unless they had control of the air?

Gen. COE. They could not, Mr. Slemp.

Mr. SLEMP. Could you conceive of another nation bringing enough airplanes over here to give them control of the air in an attack against our seacoast?

Gen. COE. No, sir; nor could they, in my opinion, attack successfully a coast fortification even with control of the air; but they can attack successfully, without control of the air, a large target such as the city of New York, or a naval base such as Pearl Harbor. They need only in that case to orient themselves; that is to say, locate themselves accurately and fire by the compass or by observation on land marks which they may be able to see. They may locate themselves even by the map with sufficient accuracy for the destruction of a large target, just as the large guns in France did. A great deal of the firing there was done by means of the map. Of course, the effort was always made to correct the fire by means of airplane observation if it was possible to get that observation.

Moreover, the character of the target in this case is such that the extreme range of the ship's guns can be utilized with the expectation of obtaining effective results. We have attempted partially to remedy this condition by the installation of 12-inch guns on carriages which will permit them to attain nearly their maximum range. This

step was taken in 1915 and the installation of the guns is completed or nearing completion.

Mr. SLEMP. What is their maximum range?

Gen. COE. Twenty-seven thousand yards as mounted.

Mr. SLEMP. Does that apply to the mortars as well as the guns?

Gen. COE. No, sir; only to the guns. The mortars have a maximum range of 15,300 yards. This fact, however, should not be lost to view, that the 12-inch gun itself is no longer capable, no matter what its mount, of making an effective attack upon the most modern type of war vessel, and the problem which confronts us is the reinforcement of our existing defenses by armament sufficiently powerful to prevent the destruction of military and civil centers which are vital to our interest by warships lying outside the zone covered by our existing armament.

The fighting in France developed the need for a gun which could attack centers of communication far behind the enemy line. The Navy had such a gun in existence in their 14-inch naval weapon. They also had a recoil system for this gun which permitted its use on a specially constructed railway car. The Army had certain guns which could be put to similar use, but the recoil mechanism of the Army gun was such that it could not be utilized on a railway car, as could the naval gun. A new recoil system had to be designed and built for the Army guns. Five 14-inch naval guns on railway mounts, manned by naval personnel, reached the western front during the summer of 1918 and accomplished most effective results. Army mounts of a similar type for large caliber guns were under construction but for the reason stated did not arrive in France in time to participate in the fight. The Army also placed under construction forty-two 14-inch guns, which would have reached France during 1919 had the war continued.

Mr. SLEMP. They did not begin the construction of those forty-two 14-inch guns. Moreover, of that number 14 guns were turned over by the Navy.

Gen. COE. That is true; yes, sir.

Mr. SLEMP. So that that left the construction of only 28, and they did not even begin work on those.

Gen. COE. Yes; they were to be paid for from Army appropriations, although the forgings and so on for the 14, as you state, came from the Navy. I did not differentiate in this statement between those two sources.

These guns were to be mounted on railway carriages, but the construction of the carriages had not been undertaken inasmuch as the building of the gun itself took a much longer time than the carriage. With the coming of the armistice the gun project was so far under way that it was decided that it should be completed, but the carriage project, not having been started, was held in abeyance.

I would like to interpolate right there. Mr. Slemp, this statement, that immediately after the armistice—in fact, on December 7, 1918—my office took up with the Ordnance the question of all construction which was under way that affected in any way the Coast Artillery, and I made a recommendation as to whether the project should be completed or stopped. Large portions of the projects were stopped and canceled entirely, although well under way. That whole

report is available at any time, if you desire to consult it. It was practically approved as submitted on December 7 after consultation with the Ordnance Bureau and the General Staff.

All of these projects I have referred to and which were covered by my memorandum of December 7 were projects that involved questions of the continuation of the project to completion or the cancellation of the project, which would involve tremendous loss to the Government. Of course, one consideration which was given due weight was whether there would be any value in completing the different projects that were under way; and if a project were valueless, or would be valueless with the coming of peace, even at a material sacrifice, it was canceled.

The CHAIRMAN. Why were they not all canceled, General, if they were not effective guns to go against such armaments as the *Hood*?

Gen. COE. They were, as far as guns go. As far as carriages go, we continued the work on certain 10-inch carriages where the parts were already manufactured and it was only a question of assembling them. While we knew that that carriage was not a suitable carriage for our work, we felt it was better, rather than to throw all that away, to complete the project and let the material remain in storage for such use as might come for it eventually.

The CHAIRMAN. Then, so far as the guns themselves were concerned, the work on them was immediately stopped?

Gen. COE. There were no large guns under manufacture for sea-coast work except the 14-inch. Of course, we had 155 field guns under manufacture and they are suitable for sea-coast work, also, for attacking destroyers.

The CHAIRMAN. But they are primarily a field gun.

Gen. COE. Yes.

The CHAIRMAN. Were you not working on some of the 16-inch guns?

Gen. COE. No, sir; we had no 16-inch guns under manufacture for France.

The CHAIRMAN. I know that.

Gen. COE. We had some 16-inch howitzers under manufacture for coast-defense purposes, under the Board of Review project, which was a separate and distinct project.

The CHAIRMAN. But if all our guns manufactured, mounted or unmounted, or in the course of manufacture, are of a type and character that are inefficient against a battleship of the style of the *Hood*, then there ought not to be a dollar spent.

Gen. COE. That is very true, Mr. Good, but the 14-inch——

The CHAIRMAN (continuing). There ought not to be a dollar spent in continuing any work on those guns, even though they were ordered for sea-coast defenses.

Gen. COE. That is absolutely true, Mr. Good, but your premises are not correct. Both the 14-inch gun and the 16-inch howitzer can successfully attack the *Hood* at all ranges up to the extreme limit of their range. There is possibly a small range between 19,000 yards and about 23,000 yards where the 14-inch gun would find it very difficult to attack the *Hood*. I have some figures I will present on that, but up to 19,000 yards the theoretical penetration is equivalent to the side armor of the *Hood*, and beyond

that, as you go out it would become less successful, but the 16-inch howitzer can attack the *Hood* at all ranges.

Mr. EAGAN. What is the maximum effective range of the 14-inch gun?

Gen. COE. About 40,000 yards. One pilot carriage for the 14-inch gun was completed during 1918 and has since been subjected to a service test. With minor modifications, this carriage provides a mount for this gun, which will make it an effective weapon for attacking either fixed land targets or movable naval targets. It is interesting to note that the development of this carriage followed as a result of the recommendation of the Board of Review on November 2, 1915, that there be constructed an experimental 14-inch gun on railroad car mount for defense against hostile landings in unfortified harbors.

A comparison of this gun with the latest model of 12-inch gun which we have in our coast defenses is as follows:

	12-inch dis.	12-inch Bar.	14-inch.	16-inch.
Length in calibers.....	40	35	50	50
Weight of projectile, in pounds.....	1,070	1,070	1,660	2,400
Muzzle velocity, foot-seconds.....	2,250	2,250	2,600	2,700
Muzzle energy, foot-tons.....	36,754	36,754	73,920	121,430
Maximum elevation, degrees.....	15	35	55	65
Maximum range, yards.....	17,300	26,800	41,570	44,850
Maximum range, miles.....	9.8	15.2	23.6	25.5

It will be seen that the power of the 14-inch gun as measured by the muzzle energy is more than double that of the 12-inch gun. The range is nearly two and one-half times as great as the 12-inch gun on the disappearing carriage and exceeds by eight miles the range of the 12-inch gun on the Barbette carriage. The 14-inch gun, at the time it was decided to proceed with its manufacture for use in France, was thought to be the largest caliber which could be successfully handled on a railway carriage and over French railroads. The fact that these guns are in the possession of the United States, at once renders the problem of their use a practical one rather than a theoretical one. As to whether or not a larger gun can be mounted satisfactorily on a railway carriage, there is room for doubt. If the question were one of deciding upon the caliber as a type for attacking battleships, there would at once come the question as to forecasting future developments in ship construction and meeting these developments as far as possible. But the actual question which presents itself is this—can the 14-inch guns which we have be utilized to improve effectively our defense project? The answer is affirmative. The accompanying table shows the armor penetration of the 14-inch gun at various ranges. The 14-inch gun can attack the side armor of the largest battleship up to 19,000 yards, and it will penetrate to the vitals through the deck armor at any range at which a biting angle can be secured. It is, therefore, an effective weapon for present-date conditions and it would appear to be very important to provide a certain number of carriages from which these guns can be fired, as otherwise they are totally valueless to the defense of the Nation.

I think that answers in another way, too, your question, Mr. Good, as to the problem which was presented. If we had to decide now

upon exactly the type of gun with which we were going to attack the *Hood*, I think it would be a grave question whether it would be the 14 or 16 inch. Of course, we can manufacture guns up to 24 inches; that is a possibility. We can manufacture 18-inch guns of .50 calibers in length, and we are asking in this bill for an appropriation for the development of one such gun.

The CHAIRMAN. But it would not be practicable to manufacture a 24-inch seacoast gun for firing at a target at sea.

Gen. COE. Yes, sir; it would be entirely practicable.

The CHAIRMAN. Would the accuracy of fire be such as to make that practicable?

Gen. COE. Yes, sir; it would be comparatively a short gun. We can not make a .50-caliber, 24-inch gun; but the Ordnance Department tell me they can make a .40-caliber, 24-inch gun. However, as long as we can successfully attack existing vessels with our existing armament—that is, the 14-inch gun—I think it is very important to take the step that will enable us to put those guns into action. Designs have been drawn by the Ordnance Department for a railroad carriage for the 16-inch gun; but it is a little doubtful, as I have stated, as to whether that will be a success or not. We know the 14-inch gun is a success; we have tested the pilot carriage.

Mr. SLEMP. General, your statement is that the 14-inch gun would be effective up to 40,000 yards; the 16-inch gun would be effective up to 50,000 yards; that is, with the target between 25 and 30 miles away. Would you favor the continuation of the manufacture of the 16-inch guns when you have a large supply of 14-inch guns on hand, for the sake of keeping a vessel between 25 and 30 miles away, when the 14-inch guns would keep the vessel 25 miles away from the coast.

Gen. COE. I would not for that particular reason, Mr. Slemp. There might be special cases where that would be necessary, and furthermore if new guns are necessary for any particular locality, as, for example, the defense of Pearl Harbor, where railway mounts are not practicable and therefore new guns have to be manufactured of one type or another, I would recommend the 16-inch gun in preference to the 14-inch.

Mr. SLEMP. Is that the only place you would recommend the 16-inch gun as compared with the 14-inch gun?

Gen. COE. No; I would not say that. It depends upon the local problem in every case. For example, if the defense of Block Island or Taboga Island or any other island of that character were demanded, I think the 16-inch is at present preferable to the 14-inch.

In all defense projects which have heretofore been presented to the fortifications committee provision has necessarily had to be made for the guns of the secondary armament. It will hereafter be unnecessary to appropriate money for this purpose. The end of the war finds the United States in possession of a large number of mobile guns of about 6 inches, which are suitable both for use with the field army and for attacking unarmored craft and defending mine fields. The number of such guns on hand is sufficient to provide amply for both of these purposes and the ammunition supply is also assured.

Were it not for the necessary and continual advancement to meet the progress made in naval construction, we might regard our defense problem as one capable of reaching a stage where it could be

regarded as finished. I take it, however, that it will always be necessary to meet this progress and that in doing so the political aspect of the world at large must be given full and just consideration by the members of this committee. I would only suggest, as a factor to be considered at the same time, the point already mentioned—that a long period must elapse between action here and the final result of such action taking the form of effective defense. Under peace-time conditions from four to five years must elapse before a 16-inch gun, authorized by this committee, will be ready for effective use.

The necessity, which I have endeavored to present, for keeping pace in seacoast armament with the developments and improvements in the defensive arrangements and offensive artillery power of foreign navies, naturally leads to a broader consideration, and that is the necessity for continued annual appropriations for the development of artillery of all types. These appropriations will no doubt at times seem large; they may even seem excessive, but they should, it seems to me, be considered precisely as if they were premiums on an insurance policy. The realization on this policy consists in knowing exactly what we want when war comes upon us and in being prepared to go ahead and make it. If the material which we produced during the war and scrapped, or which was useless or ill-adapted for the purpose for which, under the stress of war, it was designed, could be transformed into capital, the interests on that capital would, I believe, pay for all development work which would ever be necessary for ordnance material. It is not, however, financial considerations which seem to me to be the determining factor in this question. It is rather that, lacking the insurance, we are inviting national disaster.

In any case, the appropriations for cannon, carriages, and ammunition should be of such amount as would insure that the art of making such things should be kept alive. Certainly if ordnance engineering in its various and specialized branches and the types of manufacture carried on in the ordnance arsenals and in some of the manufacturing establishments of the country is allowed to atrophy, it will result in a loss to the national defense that can not be replaced by improvised and hasty methods in time of great emergency. For this reason alone, and aside from the fact that the articles they produce are needed for armament and equipment, all of these ordnance agencies and activities should be kept going on a reasonable basis.

There is a large class of items—Ordnance, Engineer, and Signal Corps—which pertain to the maintenance of the existing defenses, artillery equipment, and their accessories, which should be kept up in first-class condition. Just as there is no economy in neglecting to paint commercial wood and iron structures, so also is there no return in neglecting the upkeep of all of those parts of the defenses that not only cost a great deal to install, but also must be in good shape in order to fulfill their functions.

Mr. SLEMP. Of course, if this progression goes on in the world—first, the development of guns to penetrate armor, and then the development of armor for protection against such guns—we will have a competitive relationship that will go on indefinitely.

Gen. COE. It has always gone on. In 1892 the 10-inch gun was a satisfactory coast-defense gun, but before our defenses were completely provided with them they were obsolete. Then the 12-inch gun came, and now it is an obsolescent state.

Mr. SLEMP. It is rather a political question.

Gen. COE. Yes, sir; it certainly is.

Mr. EAGAN. What did you say was the size of the gun on the *Hood* and the size of the Japanese guns?

Gen. COE. The Japanese guns are 16-inch guns. The *Hood* has 15-inch guns. The question of the adoption of the 18-inch guns for *Hood*, I understand, was under discussion for quite a while in Great Britain, but they decided in favor of the 15-inch gun.

Mr. SLEMP. Japan has only one battleship equipped with a 16-inch gun.

Gen. COE. That is correct, I think.

Mr. SLEMP. France has none; Italy has none; Germany, of course, has none; and Great Britain has them on only two or three battleships.

Gen. COE. She has 15-inch guns.

Mr. SLEMP. There are only one or two with 16-inch guns.

Gen. COE. I do not think Great Britain has any vessels mounting 16-inch guns. In 1917 she had 10 war ships mounting 15-inch guns.

Mr. EAGAN. What is the size of the guns on the *Queen Elizabeth*?

Gen. COE. Fifteen-inch guns.

Mr. SLEMP. None of them has 17-inch guns?

Gen. COE. There is none with 17-inch guns.

In addition to two distinct classes of items referred to above, that is, (a) keeping the ordnance engineering and manufacturing facilities alive and providing new material to replace that which is obsolete; (b) maintaining the defenses and armament of the Army in first-class condition; there is another class that must be considered. We know there are national policies that last for long periods and others that change with different degrees of rapidity. Dependent upon these policies and in conformity with them must be made the plans of the War and Navy Departments for the national defense. Where these plans are clearly sound in their basic principles and where they demand that defensive measures should be taken for their fulfillment, the necessary equipment and installations should be authorized; otherwise the national defense is handicapped sorely in those particulars where the best judgment obtainable recommends defensive installations.

One point further, there should not be undertaken too many projects at the same time. This rule seems wise, that the most important projects as agreed upon should be completely provided for by appropriations before others are undertaken. The former policy puts us in a position of having a number of uncompleted projects on hand at the same time. It would seem to be better to decide upon one, the most important, and upon the rate of appropriation that can reasonably be expected, then finish it up in all of its details.

We are still in this appropriation bill asking for the completion of projects which should have been, as it always seemed to me, completed before any others were begun. That particularly applies to both fire control and ammunition. The installation of a battery of heavy guns does not make it an effective weapon. Of course, with the ammunition lacking it is a totally ineffective weapon, and with the fire control lacking, it is without power in a way. It seems to

me that a project should be looked into by this committee, decided upon, and then completed in all its details, rather than taking up new ones.

That is all the general statement I have to make, except that I have here a tabulation, prepared in accordance with your request, of the appropriations made from July, 1916, up to the present time, and a summary of what has been accomplished under the coast defense work. I do not think it would probably be worth while to read this, and I will simply incorporate it in the hearings, if you so desire.

Mr. SLEMP. That can be done.

(The statement referred to is as follows:)

GENERAL SUMMARY.

The following elements, etc., are the major net results of the appropriations:

I. Emplacements: (1) Thirty-two 12-inch L. R. gun emplacements; (2) one hundred and fifty-nine 3-inch antiaircraft gun emplacements; (3) widening 10-inch and 12-inch shot hoists; (4) beginning of Forts Story and Tilden; (5) completion of Fort MacArthur, Los Angeles.

II. Searchlights: (1) Searchlights and electrical installation of San Diego and Los Angeles; (2) procurement of one hundred and five 60-inch fixed searchlights; (3) procurement of 150 antiaircraft searchlights, on movable mounts; (4) procurement of three hundred and fifty-nine 25-kilowatt electric generating sets; (5) extending electric power at Canal Zone to Fort Grant.

III. Sites: (1) Acquisition of land at Fort Tilden, N. Y.; (2) reclamation of land, Fort MacArthur, Calif.; (3) purchase of land, Fort Funston, Calif.; (4) purchase of Hog Island, Boston; (5) purchase of Calf Island, Boston; (6) purchase of land, Fort Saulsbury, Del.; (7) purchase of Taboga Island, Panama.

IV. Land defenses: (1) Wire fences around defensive elements; (2) land defense in insular possessions and Panama supplementing seacoast batteries.

V. Fire control: (1) Fire-control systems for all batteries constructed prior to 1917; (2) bombproofing switchboard rooms and casemates; (3) fire-control systems for fourteen 12-inch L. R. batteries; (4) fire-control instruments for thirteen 12-inch L. R. batteries; (5) auxiliary base lines; (6) fire-control equipment for Fort Story; (7) extending fire-control system, Panama.

VI. Casemates: (1) Construction, remodeling, and bombproofing casemates at a number of coast defenses, United States and insular possessions; (2) mine structures at Fort Story; (3) mine structures at Galveston, Tex.

VII. Armament: (1) Manufacture of thirteen 16-inch guns; (2) manufacture of twelve 16-inch barbette carriages; (3) manufacture of one 16-inch D. C.; (4) manufacture of twelve 16-inch howitzers and carriages; (5) manufacture of forty-two 14-inch guns; (6) manufacture of thirty-two 12-inch L. R. barbette carriages; (7) manufacture of one hundred and sixty 3-inch antiaircraft guns and mounts; (8) manufacture of one 14-inch railway carriage; (9) manufacture of one 16-inch railway howitzer and carriage; (10) altering 12-inch and 14-inch gun carriages to give greater elevation.

VIII. Ammunition: The following ammunition has been procured from funds of the appropriation, "Armament of fortifications H": 1,800 3-inch 15-pounder shells; 40,000 rounds 3-inch antiaircraft shrapnel; 12,700 6-inch armor-piercing shells; 3,000 12-inch armor-piercing shells; 600 12-inch armor-piercing shots; 20 14-inch armor-piercing shells; 12,650 750 pound 12-inch mortar shells; 2,348 1,046 pounds 12-inch mortar shells; 12,700 fuzes—M. C. B. D.; 1,243,417 pounds powder; 2,200,000 pounds explosive. Procured from funds of appropriation, "Armament of fortifications K": 24,955 1-pounder shells; 1,000 4-inch 72; 2,000 6-inch proof shots; 8,000 8-inch proof shots; 103,000 pounds smokeless powder. From funds of appropriation, "Armament of fortifications C": 94,641 6-inch armor-piercing shells; 3,175 6-inch C. I. proof shots; 300 10-inch C. I. shots; 1,440 12-inch C. I. shells; 3 16-inch armor-piercing shells; 34 16-inch C. I. shells.

IX. Submarine mines: (1) Mine material to complete existing projects, United States, insular, and Panama; (2) procurement of submarine nets; (3) material for Cape Henry mine project; (4) reserve material.

X. Barracks and quarters: (1) Construction at Fort MacArthur, Calif.; (2) construction at Fort Ruger, Hawaii; (3) construction at Fort DeRussy, Hawaii; (4) construction at Fort Mills, P. I.; (5) construction at Fort DeLesseps, Panama; (6) construction at Fort Amador, Panama; (7) construction at Fort Sherman, Panama.

XI. Seawalls, etc.: (1) Restoration of seawall and defenses at Galveston (destroyed by storm of 1915); (2) seawall at Fort Warren, Boston; (3) seawall at Fort Monroe, Va.; (4) seawall at Fort St. Philip, Miss.; (5) seawall at Fort Scott, Calif.; (6) seawall at Fort DeRussy, Hawaii; (7) seawall at Fort Kamehameha, Hawaii; (8) seawall at Fort Grant, Panama; (9) shore protection Sandy Hook, N. J.

XII. Contingent expenses, seacoast fortifications: (1) Emergency expenditures; (2) miscellaneous expenditures.

XIII. Roads and trails: Roads, trails, etc., Fort Rosecrans, Calif.

XIV. Hammond torpedo: Experiments with Hammond radio dynamic torpedo.

Summary.

	Aggregate.	United States.	Insular.	Panama.
Appropriations.....	\$143,249,575.85	\$111,625,743.00	\$18,800,104.00	\$12,823,728.85
Withdrawn.....	15,418,540.19	11,699,540.19	1,605,000.00	2,114,000.00
Net appropriations.....	127,831,035.66	99,926,202.81	17,195,104.00	10,709,728.85
Expenditures.....	90,998,296.66	74,784,197.81	7,744,343.00	8,469,755.85
Difference: Dec. 31, 1919.....	36,832,739.00	25,142,005.00	9,450,761.00	2,239,973.00

Mr. SLEMP. General, your first line of defense would, of course, be the Navy. That would include the submarines, and, of course, that would be under the Navy Department. Then, second, there would be the offensive or defensive power, as you choose to call it, of the fortifications, and they would be under the control of the Chief of Coast Artillery. Then, you would have mining of the various waters that you think necessary, and that would be under the Chief of Coast Artillery.

Gen. COE. And also under the Navy.

Mr. SLEMP. And also under the Navy. Then, of course, would come the Aviation Service, and I suppose that might be under an entirely new department, but a certain portion of that is under your jurisdiction.

Gen. COE. Aviation units would be assigned to the Coast Artillery.

Mr. SLEMP. How do you coordinate in the War Department all those activities? Have you a joint board?

Gen. COE. They are coordinated by the General Staff. One section of the War Plans Division of the General Staff is linked with a similar section of the Navy Staff, which constitutes a continuing body which is always available for the studying of problems in which both services are interested, and which is always exercising a coordinating power; but the final body for passing upon important question is the joint board, which is constituted by the Chief of Staff, the Chief of Operations, and the Chief of the War Plans Division for the Army, and three naval officers, including the Chief of Operations for the Navy Department. They constitute the joint board.

Mr. SLEMP. Would that board, then, pass upon the advisability of new projects from the standpoint of defense?

Gen. COE. They would where both the Army and Navy are interested, as, of course, they are in a great many of the sea-coast projects, and they are passing upon such problems continually.

Mr. SLEMP. Looking at this proposition as a whole, and considering the strength of our Navy, the number of our submarines, the amount of mining material we have on hand, the number of guns that are mobile, and the development of the machine guns for attack against landing forces, do you not think that our condition for defense purposes is better and stronger than ever before in our history?

Gen. COE. There is no doubt it is stronger. It has never grown weaker.

Mr. SLEMP. But its power relative to conditions in the world is greater than ever before, is it not?

Gen. COE. It would be hard to answer that definitely; but I hardly think so, because you have to balance your guns against the development in naval offensive power, and that is something that undoubtedly received great stimulus during the war. We have not met that as yet, except in the design of types. We have not met that development with greater guns in place. I should estimate that our maximum condition of relative power of defense was reached about 15 years ago.

Mr. SLEMP. I am summing all of your defense propositions up; and taking into consideration aviation, submarines, the tremendous number of guns we have that we can throw to any point of attack on land for protection against any landing force anywhere.

Gen. COE. Yes, sir; there is no question about that.

Mr. SLEMP. Coming down to more specific details, you have your 12-inch guns and 12-inch mortar propositions, and all of the guns of lower calibers, from those on down, are completed so far as this committee is concerned?

Gen. COE. Yes, sir.

Mr. SLEMP. Then, you have in addition to that a tremendous number of 14-inch guns that have not been asked for in any Board of Review project.

Gen. COE. They have not been asked for.

Mr. SLEMP. You have forty-two 14-inch guns—surplus material over and above the 12-inch guns.

Gen. COE. Yes, sir.

Mr. SLEMP. The next question is, to what extent will you go into the production and installation of guns of higher caliber?

FOURTEEN-INCH GUNS AND MOUNTS.

Gen. COE. The first thing to consider would be the utilization of the 14-inch guns, which are not in a condition to use simply because the guns themselves are completed; there are no carriages provided for them. As I said, no projects in that direction were started after the signing of the armistice.

Mr. SLEMP. I suppose this will come up later, but you have 13 of those 14-inch guns on what they call naval mounts already.

Gen. COE. The naval mount is of no value as a coast-defense mount.

Mr. SLEMP. Unless you put it on some blocks, or give it a wider traverse. That is the only point.

Gen. COE. Yes, sir; that is the only point in one sense; but to do that would involve an expenditure of approximately \$90,000 per mount, and the result would be very inefficient. I think it would be very unwise. No such construction has been made, and I am not sure that it would be practicable even. I know that it would be inefficient. The turntable that would be put in one of those mounts would have to be 200 feet in diameter. We have studied the problem and have drawn plans, and the estimate was \$90,000 per mount, and for a mount which must be looked upon as purely a makeshift.

Mr. SLEMP. That is, over the cost of the carriage, or of the type of carriage you are speaking of?

Gen. COE. Yes, sir. If we thought we could get an efficient carriage, even though it were awkward, by that means, I would recommend it to the committee, but I think that the only thing to be done with those mounts is to retain them for such use as they were designed for. They were designed to go into position to fire upon a target on land—that is, upon a fixed target. The target would be located beforehand as well as the position to be occupied, from which they could fire on the target.

Mr. SLEMP. Why could they not have been turned over to the sea-coast defenses?

Gen. COE. It was understood that in case other guns of that kind were sent to France, they would be manned by Coast Artillery troops. They were manned by the Navy as a makeshift for an emergency, and any other guns of that kind sent to France would have been manned by the Coast Artillery. When the end of the war came, we simply took them over as a part of the existing matériel, with the idea that we could keep them, and that they might, of course, possibly come into play at some other time.

Mr. SLEMP. They are surplus, at any rate?

Gen. COE. They are of no value for defense work.

Mr. SLEMP. That is, the mounts?

Gen. COE. Yes, sir; the mounts. We had railway guns in the Civil War; and if the problem had been studied and proper development work carried on, we would never have made that type of railway mount that was sent to France, because the type of railway mount for which we are asking an appropriation now is more efficient for the work such as was accomplished in France than those that the Navy adopted and that you spoke of.

MOBILIZATION OF SEACOAST ARTILLERY.

Mr. SLEMP. Is there any change in the attitude on the part of the Coast Artillery in regard to the greater mobility of guns on the seacoast as opposed to guns in fixed emplacements?

Gen. COE. I think that everything that can be mobilized should be mobilized. There is, perhaps, a misapprehension as to just what is meant by railway mobility or the railway carriage. It is not the idea that the 14-inch gun can be put on a railway carriage and that it can be fired from any position on a target which it might happen to cover; certain preparation is necessary for it at the place from which it is to be fired. Essentially, a concrete block is necessary, over which the gun is run on its trucks and then placed upon that

block. This operation would occupy a matter of an hour or an hour and a half; perhaps sometimes less time. Having been placed on the block, it is practically as though placed on a barbette carriage on solid foundation. It can be taken from that position then to a similar position on the coast, or any position accessible by railroad, so that it can be utilized for whatever purpose seems desirable.

Mr. SLEMP. As to the accuracy of fire from a railroad mount as compared with the accuracy of fire from a fixed emplacement, what have you to say?

Gen. COE. With regard to accuracy and rapidity of fire both, what we are aiming to have is a barbette carriage which will give us exactly the same stability of carriage as any other barbette carriage could give. We would not be satisfied with any anchorage that did not. The 12-inch gun mounted on a disappearing carriage would have the maximum range we could get from that carriage i. e. 12,000 yards. The gun itself is able to fire at a range of 27,500 yards, so that we would have only 12/27 of the range of the gun which we could utilize. Now, we have taken the position that every carriage that is designed and provided in the future must enable us to utilize the full power and range of the gun.

Mr. SLEMP. Its range depends upon the elevation to a certain extent, and that is involved in the barbette carriage.

Gen. COE. Yes, sir; with the barbette carriage, we obtain the maximum range and utilize the full power of the gun. Of course, you can protect the carriage, and afford it even better protection than that provided with the disappearing carriage; that is by withdrawal somewhat from the beach line and the screening of the gun itself. On the Belgium coast, for example, there were on a line of 30 miles something like 150 guns emplaced. They were subject to bombardment by the allied vessels all the time, but I do not know of a single battery that was destroyed by hostile gun fire. They were all placed behind sand dunes which line the Belgian coast, somewhat similar to the conditions along the Virginia coast in the vicinity of Cape Henry. They were back from the coast, and practically in all cases were unprotected.

Mr. SLEMP. When you remember that the maximum time consumed in installing those fortifications was only six weeks, would not that give us some indication as to the best method to follow in our own defenses?

Gen. COE. I think it would undoubtedly, and that is exactly the line we are taking at the present time.

Mr. SLEMP. There was an article that appeared some time ago in the Journal of Coast Artillery describing installation of that kind: Would you mind making a brief of that article and inserting it in the record? I think that should be preserved.

Gen. COE. I will do so; yes, sir.

GERMAN COAST DEFENSE OF THE BELGIAN COAST.

The original installation of guns on the Belgian coast was intended to provide harbor defenses at Ostend and Zeebrugge, but to secure an effective defense of their right flank the Germans found it necessary to extend their original gun defense to include practically the entire coast line from Nieuport to the border of Holland, a distance of about 25 miles. Within this sector there were mounted: Four 38-centimeter guns, 15 inch; four 305-millimeter

guns, 12 inch; twenty 28-centimeter guns, 11 inch; four 28-centimeter mortars, 11 inch; four 21-centimeter guns, 8 inch; sixteen 17-centimeter guns, 6.7 inch; thirty-two 15-centimeter guns, 6 inch; four 105-millimeter guns, 4 inch; eight 90-millimeter guns, 3.5 inch; sixteen 8.8-millimeter guns, 3.4 inch—a total of 76 guns smaller than 8 inch and 36 guns and mortars 8-inch caliber and larger.

The primary batteries were located from 500 to 2,000 yards from the shore line, where they were concealed and to a certain extent protected by the sand dunes.

The intermediate armament was generally located in the line of sand dunes, and the secondary armament was close to the shore.

A large number of antiaircraft guns were installed and located well back from the beach. Local antiaircraft machine-gun defense was provided for primary and intermediate batteries.

Land defense guns were located well to the front to cover the beach.

The rear of the line of batteries and approaches to possible landing places were covered by well-constructed lines of infantry trenches.

Only five searchlight stations were found after the German retreat.

The guns were of various models dating from 1887 to 1916. The average ranges were 18 miles for the major caliber, 10 miles for the intermediate caliber, and 7.5 miles for the minor caliber armament.

The guns and carriages mounted prior to August, 1917, were coast defense or naval guns on such mounts as were available. A study of these batteries emphasizes the following features:

1. Absence of parapet protection.
2. Simplicity and economy of construction.
3. All round fire and elevation.

All major caliber guns installed after August, 1917, were on railway carriages. Four railway batteries, of four 28-centimeter, 11-inch guns each, were installed between September, 1917, and March, 1918. The carriages on which these guns were mounted are very inferior as compared to the United States 14-inch model E, but they rendered efficient service. All 16 of these railway guns were withdrawn during the German retirement and were the only coast guns not captured.

These defenses were not seriously damaged by the heavy gunfire to which they were often subjected. This is probably due to:

1. The ranges at which ships had to fire.
2. Withdrawal of batteries from the shore line.
3. Concealment of batteries, rather than heavy concrete and earth parapets depended upon for protection.

BOARD OF REVIEW PROJECT.

Mr. SLEMP. Summarizing what has been accomplished since 1916, when we started on the program of \$23,000,000, based on practically what was the Board of Review's project for four years, as I remember the statement made before the chairman of the committee at that time, how far have you gotten along with that work during the past four years? It has now been four years since we started to complete the Board of Review's project, and that takes in the period of the war?

Gen. COE. The work under the Board of Review's project which has been carried on during the war has been, first, the completion of the construction of the long-range 12-inch batteries which were provided for in that project.

Mr. SLEMP. Have you had any doubts as to the wisdom of proceeding with 12-inch batteries, due to the fact that you felt while constructing them that you were doing obsolescent work, or work that would be immediately obsolescent.

Gen. COE. That work was started in 1915. At that time it was not regarded as obsolescent. Of course, the appropriations were all made and the work was under way, and it has been continued. It

is my opinion that we have been installing practically obsolete guns in doing that, but, at the same time, we have this probability to meet, that while those guns may be nearly obsolete, they may be used against vessels that are also nearly obsolete. Undoubtedly a certain proportion of the vessels in any fleet brought against our shores at any time for attack would be of such a type as attacked the Belgium coast during the war, and those vessels will be susceptible to successful attack by the 12-inch guns. However, I think if we were going to do it over again, instead of taking the conditions as they existed in 1915, we would not spend that money for that purpose.

Mr. SLEMP. How much money have you expended on each seacoast fortification since 1915?

Gen. COE. For construction work?

Mr. SLEMP. Just generally.

Gen. COE. That will be shown in the tables you have requested me to insert. We have expended for items detailed in this summary \$90,988,296.06. The balance unexpended on December 31, 1919, was \$36,832,779.

Of course, I would like to say that this is a very difficult figure to arrive at, and we had to estimate the amounts in many cases.

Mr. SLEMP. So the net expenditures, amounting to about \$90,000,000, would be more than two-thirds of the total expenditures for this purpose in all our fortification bills since the time of the starting of the Endicott Board—that is, we have spent in these four years two-thirds as much money as we had previously spent from the time the Endicott Board first made its recommendations.

The CHAIRMAN. My recollection is that the Board of Review's project involved an estimated cost of \$96,000,000; is that correct?

Gen. COE. Yes, sir.

The CHAIRMAN. You have spent \$90,000,000 since you commenced on that project? Have you about completed the project?

Gen. COE. Well, Mr. Good, we have not that project completed because that money has not been spent in the execution of that project. For instance, out of this \$90,000,000 comes 42 14-inch guns which are not in that project at all, and certain other items, such as submarine nets which were put down during the war. We have charged everything in that total which was expended in that direction. I think probably the largest item is for ammunition. Now, the ammunition item is quite uncertain, because whether the ammunition was for use in France or whether the expenditure was for that purpose or whether for the other coast defenses it is practically impossible to tell; but we worked backward, in order to obtain that figure, partially, by taking the amount of ammunition which we had on hand and which is under contract and have figured we will take all of that no matter what its original purpose was. Then, of course, another thing is that when you go to compare the figures, the cost of production as against the estimates in the Board of Review's project is practically double.

Mr. SLEMP. If you translate this all into somewhat immediate action you are not considering anything from the 12-inch mortars down, including the 12-inch mortars?

Gen. COE. Nothing.

Mr. SLEMP. And you are asking for nothing in regard to the 14-inch guns except carriages?

Gen. COE. Yes, sir. Col. Sherrill calls my attention to the fact that there is a small item for completing the work on certain 12-inch batteries which have not been completed, but that is simply a reappropriation of existing funds which, if not reappropriated, will be turned into the Treasury on June 30.

Mr. SLEMP. Then the Board of Review's project, when finally analyzed, goes simply to the question of the extent to which we will go into the manufacture of emplacements for 16-inch guns, so far as artillery is concerned, and they request one 18-inch gun?

Gen. COE. Yes, sir; and the manufacture of five 16-inch guns.

Mr. SLEMP. There has been no meeting of the board of review since 1915?

WAR PLANS SECTION OF GENERAL STAFF.

Gen. COE. No. The work which the board of review did is now being performed by the War Plans Section of the General Staff and the joint Army and Navy agencies that are considering allied subjects.

Mr. SLEMP. Have they specifically taken up the board of review's project and passed upon it?

Gen. COE. No; not as far as I know.

Mr. SLEMP. Are the estimates and the recommendations in this bill based upon the action in 1915 or upon some subsequent action of your War Plans Board? Where do we tie ourselves to that?

Gen. COE. We are asking in this bill for certain items which are covered in the board of review's project, but that project was, in general, modified by a memorandum which was submitted by the Chief of Coast Artillery last year and approved on July 22, 1919.

Mr. SLEMP. Approved by whom?

Gen. COE. By the Secretary of War. It was considered by the War Plans Division of the General Staff.

Mr. SLEMP. And they also approved it?

Gen. COE. Yes; it was approved by the War Department and by everybody.

Mr. SLEMP. On the War Plans Board do they have a representative of the Navy Department and of Aviation, or is it exclusively an Army proposition?

Gen. COE. It is exclusively an Army proposition, except that a section of the War Plans Division, whenever a problem comes up which involves the Navy in any way, has a standing committee which works with a standing naval committee for the consideration of the joint projects. I was going to say that this recommendation by the Chief of Coast Artillery was based upon certain conditions which exist as a result of the war and its completion; that is, the important thing which affected the board of review's project was the fact that we had forty-two 14-inch guns.

Mr. SLEMP. I do not see that it has affected it at all, because you do not stop the production of your 16-inch guns.

SIXTEEN-INCH RIFLES AND HOWITZERS.

Gen. COE. It does affect it very materially. The Board of Review's project comprised twenty-two 16-inch rifles, forty-eight 16-inch howitzers, and guns of other caliber, but now we have con-

structed or under construction thirteen 16-inch rifles and eight 16-inch howitzers instead of 22 and 48.

Mr. SLEMP. I do not understand that you have abandoned the remaining number from 13 to 22 for the 16-inch guns.

Gen. COE. We have abandoned them very largely; yes; but not in all cases. For example, we have not abandoned the project of the board of review for 16-inch guns at Oahu.

Mr. SLEMP. And you have picked out a few places on the Atlantic coast, and one place, at least, in our insular possessions, where you think 16-inch guns would fit in?

Gen. COE. Yes, sir.

The CHAIRMAN. General Coe, has General Order No. 9, of February 20, 1915, been rescinded in any way, or modified?

Gen. COE. I do not know what that order is.

The CHAIRMAN. That is the order providing for the board of review.

Col. GULICK. Yes, sir; that has been revoked.

The CHAIRMAN. General Order No. 9 provides:

All papers pertaining to the coast defense or the immediate land defense of coast fortifications, which involve new projects or modifications of old projects, and which may come to or originate in the War Department, after the preliminary consideration by such officers as the Chief of Staff may direct and before final action is taken by the Secretary of War, will be referred to the War Department Board of Review for further consideration and recommendation.

If that is in effect and if there has been no meeting of the Board of Review with regard to this enlarged program that you are now presenting I do not see how Congress is in a very good position to consider any estimate for a modification, because the general order provides that before any action shall be taken upon it, it shall be referred to the board of review and the board of review shall act.

ABOLITION OF BOARD OF REVIEW.

Gen. COE. I am informed that General Order No. 9, to which you are referring, has been revoked. I was not sure whether it had been explicitly revoked, but General Order No. 80, of the War Department, 1918, revoked it to all intents and purposes by providing the agencies which shall consider questions such as we have under advisement. It reads, in part:

The War Plans Division, General Staff, will consider the subject of seacoast defense in its broadest sense, with the object of utilizing all the means and elements available to the end in view. It will state the definite mission of each element and such general principles as will enable the combat and technical services to accomplish their specific missions.

The War Plans Division will be charged with cognizance of all questions referred to it by proper authority involving new or modified seacoast defense projects and of coordinating the action of the several combat and technical services in the development of plans or projects relative to seacoast defense.

Projects relative to purely harbor defense will be prepared by the Chief of Engineers, Ordnance, and Coast Artillery jointly or through officers designated by them.

If the above-named officers are unable to agree on the details of any project, the papers in the case will be referred to the War Plans Division, General Staff, for necessary action. Completed projects will be referred to the War Plans Division for review and for recommendation to the Chief of Staff, for final action. Upon approval by the Chief of Staff, acting for the Secretary of War, the plan or project becomes, and will be designated, as "approved project" of the War Department.

The CHAIRMAN. Then you have practically substituted the War Plans Division of the General Staff for the board of review?

Gen. COE. Yes, sir; that is true.

Mr. SLEMP. Has the War Plans Division of the General Staff passed specifically upon these 16-inch guns, 14-inch guns, and all that?

Gen. COE. Yes, sir; they have passed specifically upon the items in this bill and which are covered in the sheets which you have.

The CHAIRMAN. What was the reason for practically abandoning the board of review? That board was made up, as I recall, of officers of both the Army and the Navy.

Gen. COE. I do not think there were any naval officers on the board of review.

Col. EMBICK. It was composed of Army men only.

Gen. COE. At times there may have been a naval officer associated with the board of review, and I think there was at one time, but temporarily. However, I think the present policy of the War Department is to have, instead of a board convened from time to time, a permanent and standing staff committee for the consideration of these subjects, comprised of both Army and Navy officers. Such a committee has been in effective operation for some months now.

RAILWAY AND HIGHWAY FACILITIES FOR RAILWAY AND TRACTOR ARTILLERY.

Mr. SLEMP. Have you gentlemen been making any investigation of the railway situation along the coast for railway artillery and also highways for your tractor artillery?

Gen. COE. We have made quite extensive investigations of the railroad question, but we have not taken up actively as yet the question of highways. I would like to show you a map. This map shows the railroads of the country that can be traversed by various-sized guns and mounts. We are having made now blue prints to send to the various department commanders for a study of the specific question of the use of tractor artillery on various highways, and so on; that is a question which must be decentralized. The work must be done locally, more or less. This map shows the eastern portion of the United States and shows the various railroad lines that can carry the heaviest guns; that is, the 14-inch guns, those that can carry the intermediate guns, such as the 10-inch guns, and those that can carry the 8-inch guns and the 12-inch mortars.

Mr. SLEMP. Beginning at Portland and going down the coast, what would you have to say about that?

Gen. COE. From Chesapeake to Portland practically all roads can be utilized; south of Chesapeake Bay all roads could be utilized, probably, in time of war, because then we would take measures to strengthen bridges and increase the clearance of the roads, which is impracticable in time of peace. However, in time of peace, as you see here, the 12-inch mortars and 8-inch rifles can go over all roads.

Mr. SLEMP. If you take from Chesapeake Bay up to Portland and give protection through railway mounts you really protect the large centers of population which are near the coast without additional fixed emplacements?

Gen. COE. You do in this way: That is if your railroads can reach strategic points. Take Montauk Point; if you can put a 14-inch gun at Montauk Point then you are affording great protection at Narragansett; if you put 14-inch guns at Rockaway Beach you can cover the sectors from which naval vessels can reach New York. Of course, it does not mean you are going to run these guns along the tracks and fire them from the tracks as you go along; that is frequently a popular misapprehension of the purpose. The real thing is that you can send them to strategic points, and in case an enemy attack develops against centers which are inadequately protected, you can reenforce the defense to the limit of your resources.

Mr. FRENCH. At this place you would have a definite sort of basis upon which the guns could be run?

Gen. COE. For the heavier calibers; yes. But not as to the 8-inch guns, because they can not attack vessels. We can fire those from any track in 15 minutes and we can fire them in any direction; that is, they have an arc of fire of 360 degrees.

Mr. SLEMP. That is the smaller type?

Gen. COE. Yes.

Mr. SLEMP. Could you fire 14-inch guns in the same way?

Gen. COE. No; the 14-inch gun has to go on a prepared block; it is not absolutely necessary that it should be of concrete; that is, we could improvise a broken stone foundation for the 14-inch gun, put it in position and fire it, but if we have the time—and you ordinarily would have, when you are going to use as big a gun as that—we would prepare a concrete foundation.

Mr. FRENCH. Those would be definitely prepared ahead?

Gen. COE. Yes.

Mr. FRENCH. Because it would be well known where they would be desired?

Gen. COE. Yes, sir.

ACCURACY OF FIRE FROM RAILWAY MOUNTS.

The CHAIRMAN. Last year Gen. Black's idea was that when you got beyond a 10-inch gun you could not have accuracy of fire or the rapidity of fire necessary to work effectively against a moving target from a railway mount?

Gen. COE. Well, perhaps Gen. Black had in mind at that time a sliding type of mount, or something similar, and I think he did, although I do not recall exactly what he said; but if so, that is entirely correct; it is quite impossible, as I told Mr. Slemp before, to utilize a 14-inch railway mount, such as designed and used in France against a moving target; it is quite impossible.

Mr. SLEMP. Since that time have you not made rather extensive experiments at Fort Story?

Gen. COE. Yes; we have. But we find from an altogether different type of mount, which was a barbette mount on a solid platform. As you may see here [showing photograph], the railway truck under the ends of the carriage is simply an incident to it, and it renders it possible to move the carriage with ease and facility; it is so designed that it will go through the clearance diagram of the main trunk line

railroads. We actually take the trucks out from under the gun when we fire it and it stands on a barbette carriage, with an arc of fire of 360 degrees.

It may be said that every 12-inch gun we have is capable of being moved from New York to San Francisco; but it would take, perhaps, six months to do it; while the point about the 14-inch type of mount, which we are speaking of now, is that instead of taking six months it only takes a few hours to put it en route and the main time would be consumed in transportation from one coast to the other. Once it is in position on either coast it is just as effective a carriage as any type we believe can be designed, and we would not be satisfied with anything that was not. Such a type of carriage as will give us the maximum rate of fire, maximum stability, and maximum accuracy.

The CHAIRMAN. What was the result of your practice?

Gen. COE. At Fort Story?

The CHAIRMAN. Yes.

Gen. COE. We tested down there the type "E" 14-inch mount, and we found it very satisfactory, and only minor modifications were adopted for further use.

The CHAIRMAN. Did you fire at a moving target?

Gen. COE. Yes.

The CHAIRMAN. At what distances?

Gen. COE. I do not remember the ranges, but up to 30,000 yards, probably.

The CHAIRMAN. With what percentage of hits?

Gen. COE. I do not know the percentage of hits; but we figured the probable error, which is the way we measure the accuracy of the gun, and that was fully within what we expected.

The CHAIRMAN. Did you hit the target at all?

Gen. COE. We never hit the actual target, which is nothing but a little towed pyramidal thing about 10 feet square. We never actually hit that target.

The CHAIRMAN. You do have larger targets than that when you are firing your coast defense guns?

Gen. COE. Not now. We had those for a while, but we stopped them. They were not satisfactory. They were only 30 feet high and 60 feet long, I believe, and we never hit those at long ranges either, or rarely ever. Of course, they simply marked the position of the battleship.

The CHAIRMAN. General, with this small target how can you tell the percentage of errors?

Gen. COE. Because we photograph the splashes and the point at which we are aiming and determine the dispersion very carefully by measuring it on the photograph.

The CHAIRMAN. And what was the percentage of error in this test?

Gen. COE. I can not recall the exact figures, but I will put those in the record for you.

NOTE.—The probable range error in this firing was about 160 yards for a range of 22,000 yards.

FIRE CONTROL, 12 AND 14 INCH GUNS.

Mr. SLEMP. General, you have not developed any fire control that can be relied upon for 14-inch guns beyond the present range of visibility and that would place the 14-inch gun in the same class as the 12-inch gun, would it not?

Gen. COE. No, sir; because the range of visibility is beyond the maximum range of the 12-inch gun at times; not always. We are utilizing balloons for observation points, and increasing the range of visibility; but the maximum range of visibility is an indefinite thing quite impossible to specify.

Mr. SLEMP. Your 12-inch guns have a range of from 18,000 to 24,000 yards, which is about 15 miles, and taking into consideration the curvature of the earth, that brings it within the limit of visibility.

Gen. COE. That all depends upon the height of the observation point. Of course, with a balloon the curvature does not come in. It is purely a question of the qualities of the atmosphere that permits you to see or not, because you at once get to a height where the curvature of the earth does not enter.

Mr. SLEMP. To what range have you worked out your fire control—how many yards?

Gen. COE. To the limit of visibility, whatever that may be, from day to day. Sometimes it may be 50,000 yards and at other times it would not be. Of course, we are working on the airplane control, sending the airplane out over the target. We have made experiments in locating vessels by observation on an airplane over the vessel either by radio or otherwise; but I am not prepared to state that that is going to be a satisfactory solution. We are also working on subaqueous range finding. There again, I do not know what the outcome is to be.

Mr. SLEMP. Your investigations will proceed for the next 10 years on that proposition?

Gen. COE. Perhaps so, but the 14-inch gun is important within the limits of visibility whatever that may happen to be, and that changes from day to day. Of course, when the invisibility affects you it also affects the enemy; sometimes, perhaps, to the advantage of one and sometimes to the advantage of the other.

Mr. SLEMP. General, you took away 376 guns from your seacoast defenses to send to France; have they been restored to the coast defenses?

Gen. COE. They have all been returned to this country. Some of them have been restored to their original carriages in the seacoast defenses and others have been retained on railroad or mobile carriages, and are available for coast defense in any part of the country rather than in the limited place where they were before. In all cases where we have the guns on mobile carriages, we have secured an increase of range by using a carriage which gave us a greater elevation.

Mr. SLEMP. Do you not regard the absence of those that you are not reinstating of any vital importance?

Gen. COE. We regard them as being more valuable than they were before.

Mr. SLEMP. That is on account of new mounts.

Gen. COE. Yes, sir.

Mr. SLEMP. How about those you have not restored?

Gen. COE. We have practically all of them reinstated except certain 6-inch guns, and the question of the utilization of them is now under consideration. All the others are either back where they were before in the coast defenses or are on mobile mounts and can be sent to that coast defense or any other that we want to send it to.

The CHAIRMAN. General, I understand you to say there was no objection now to making known just what the Board of Review project was and the modifications of it by this division in the General Staff.

Gen. COE. No, sir; I think there is no objection to the Board of Review project. I did not say, Mr. Good, about the modifications. I would have to look into that a little carefully. I agree with you on the general proposition that what we conceal is known just as well as what we publish, but I still think that sometimes it is undesirable to emphasize by publication certain facts which probably are generally known just the same.

The CHAIRMAN. In the table giving the board of review project in full, the first item was for the submarine mines in the Kennebec River and submarine structures and searchlights, and I have wondered whether or not you can take that table and then give us the extent to which each of those projects has been completed, the date of completion, and the total cost.

Gen. COE. I can; yes, sir.

The CHAIRMAN. And give us another table, if there be no objection to it, giving the modifications, and if there are objections to giving the locations, then eliminate the locations but give the estimated cost and the extent to which the modified plan has been carried out together with the cost. If that can be done then the committee at all times will have before it a working sheet so that we may know just what the plans of the department are so far as the fortifications are concerned, what the estimated cost is, and the extent to which they have been completed.

Gen. COE. Yes.

EFFECTIVENESS OF EXISTING FORTIFICATIONS.

The CHAIRMAN. General, when the fortifications were under discussion in 1914, Gen. Wood, Chief of Staff at that time, was asked a few questions by Mr. Sherley, as follows:

Mr. SHERLEY. It has been testified heretofore that so far as the continental United States was concerned, we were not only adequately fortified, but in many instances overfortified.

Gen. WOOD. Yes, sir.

Mr. SHERLEY. And you concur in that general proposition?

Gen. WOOD. Yes, sir.

Mr. SHERLEY. In your judgment, would it ever be necessary, as to the large proportion of fortified places, to make any change in the armament that has been provided?

Gen. WOOD. No, sir; except possibly in the type of mortar carriages and some other minor changes which might involve the placing possibly at an advanced point a battery or two of a heavier type of gun, but essentially the present armaments will remain intact, so far as we can see.

Mr. SHERLEY. It is, then, the opinion of the War Department now that, with the exception of the possible need of increasing the armament at San

Diego and providing for the armament now authorized at San Pedro and Cape Henry, the coast of the continental United States is adequately fortified.

Gen. WOOD. The Taft Board project, which Congress approved, still remains. Some portion of it we do not think will ever need to be carried out. Other portions of it, we think, will need to be carried out, but, generally speaking, it can be said, with the exception of the places you have mentioned on the Pacific coast and the work at the mouth of Chesapeake Bay, that the essential features of the coast defenses have been completed.

That was before the adoption of the Board of Review project, but subsequent to the adoption of that project, and in 1916, Gen. Weaver was asked with regard to the fortifications this question:

Mr. SHERLEY. Leaving out for the moment the question of the caliber of guns, do you consider that our seacoast fortifications, having in mind the guns, projectiles used, fire control, and all of the accessories that go with a battery, compare favorably or unfavorably with those of other countries?

Gen. WEAVER. I have been a close student of the whole subject, naturally, for a number of years, and I know of no fortifications in the world, as far as my reading, observation, and knowledge goes, that compare favorably in efficiency with ours.

And the examination continues along that line. I would like to know now what your opinion is with regard to our seacoast fortifications, speaking of them in a large way and taking a survey of them all after we have spent approximately \$90,000,000 on them, most of which has been expended on the fortifications in securing guns and carriages for them; as to what your opinion is as to the efficiency of the seacoast fortifications of the United States?

Gen. COE. I said to the committee last year, Mr. Good, and I think I can repeat it now without any change of opinion, that our fortifications establish a zone within which hostile vessels will not penetrate, and that zone is about 12,000 yards from the guns. In my general discussion this morning, as I pointed out, the very latest type of battleships might come within that zone and be practically immune from damage; but they would not do so, in my judgment, except under the rarest circumstances. There are certain deficiencies in armament even for the protection of that zone. There is the deficiency of ammunition, which undoubtedly will come up as a separate discussion on the items in the bill. Before we entered the war—in fact, up to the time of the Battle of Jutland—in the Coast Artillery we had adopted the same policy that the British Navy had with regard to its projectiles; that is, that a shell was an effective type of projectile to attack an armored vessel. The Battle of Jutland convinced the British Navy of their mistake to such an extent that they changed their ammunition supply for the whole British Fleet during the war and immediately subsequent to the battle. I think it is essential that we should make that change slowly. The firms manufacturing projectiles, of course, are continually improving the projectile work as the armor also improves, and the projectile which we can get now is better than any projectile we could buy even up to six months ago. I understand that the reply may be made to that, "You never can decide upon when you have reached the point where you get the best projectile," and that is very true; you never can. It may be to-morrow the whole thing will disappear, but as it stands to-day, the coast defenses are equipped with an inferior projectile which will probably not penetrate anything like the armor that it is expected to.

Now, to continue what I said also last year, this zone of 12,000 yards in certain important places does not protect what it was designed to do and what it did do when it was installed. It does not protect New York City from bombardment.

Mr. SLEMP. That does not apply to many vessels in the world, does it?

Gen. COE. It applies to a good many vessels now, Mr. Slemp; yes. It applies probably to all vessels which were launched subsequent to 1916.

Mr. SLEMP. But in stating that, you assume that the Navy and the naval forces of the United States have been destroyed and can not keep that sort of a vessel far enough away from these centers of population.

Gen. COE. Certainly I do. I am not counting in the Navy at all. I am speaking solely of the defenses. Of course, if the Navy is always successful and drives the enemy fleet from the sea, there is no necessity for any defenses at all after that is once accomplished; but the Navy, however, wish to feel secure in their bases. They wish to feel that the bases at Hampton Roads, Narragansett Bay, Oahu, the Canal Zone, and others, are secure, whether they are present or not, or whether they have had a fight with the enemy fleet or not.

The CHAIRMAN. General, of course I can see how a naval vessel could mount a gun like the German Bertha or the new gun which I understand France has developed that will fire a great deal farther than that, and if that gun can be mounted on a vessel, it could fire at a large city and do great damage, but I doubt if you will ever be able to plan a gun for the seacoast defenses that will have an accuracy of fire sufficient to keep that kind of a vessel with that kind of a gun mounted on it out of range of firing upon such a large center of population.

Gen. COE. I think you are quite right. I think that is very doubtful. No such guns have been mounted on vessels so far, and I was not speaking of that class of weapon.

The CHAIRMAN. It is not improbable they will be. The progress in both naval guns and seacoast guns has been very rapid in the last few years.

Gen. COE. That is true.

The CHAIRMAN. And it is not improbable.

Gen. COE. It is not impossible, certainly; and then that will have to be met in some way or you will lay yourself open to damage; but, of course, it will be impossible for such guns mounted upon a vessel to attack a thing as small as a naval station or a naval base. It is possible, however, for guns of ranges up to 40,000 and 50,000 yards to make such attacks, because they are then within sight of shore points which will give them their own location accurately. Now, if you are going to fire at ranges of 50 or 60 or 70 miles, then you are entirely away from the shore, and you can not orient yourself accurately. The vessel would find it very difficult to hit, I think, a target even the size of New York. Many of the shells that were fired from the big Bertha did not fall within the city limits of Paris.

The CHAIRMAN. Will not the defense in such cases, even in the case of a gun like those mounted on the *Hood* or the *Queen Eliza*-

beth, be to rely a good deal on the Air Service, assuming the Navy has been destroyed.

Gen. COE. I did not quite catch your question as to the use of the Air Service.

The CHAIRMAN. Would not the coast defenses be compelled to rely more upon the Air Service to destroy a vessel that had guns mounted upon it like those mounted on the *Hood* or the *Queen Elizabeth*?

Gen. COE. I do not think that is practicable. The published statements are to the effect that the battleship cruiser *Goeben*, which went ashore in the eastern part of the Mediterranean at one stage of the war, was struck by 13 bombs dropped from airplanes. It is a known fact that the *Goeben* struck at different stages of her career six different mines or torpedoes. That vessel is still afloat. It never has sunk. It has not been destroyed; in fact, it is a highly efficient vessel to-day, and it was able at all times to proceed under its own power, I believe, except when it went ashore. The destruction of a naval vessel of that type from the air is a very difficult matter. In order to secure penetration you have to go to a great height, so as to get the velocity to go through her decks and do very much damage; and when you do that the accuracy is worse than it is in firing from a gun on the shore. What the developments are in the Air Service nobody can surely predict, and it may be that successful attacks from the air upon vessels of that type will come some day, but at the present time I do not see that it is here.

The CHAIRMAN. But if a shore be fortified like our fortifications at New York, supplemented with efficient submarines, do you think, even though the dreadnoughts of the Navy were destroyed, that a vessel would run the risk of going near enough to New York so that it could fire upon the city and do any damage?

Gen. COE. With the fleet destroyed I do not think there is any question about it.

The CHAIRMAN. I am assuming that the submarines would not be destroyed.

Gen. COE. I do not think that would protect them. With the fleet destroyed they will take chances and will protect themselves from submarine attack by destroyers as they did all the time in the North Sea; but I do not think any such thing would ever be done as long as the fleet was in existence.

The CHAIRMAN. Of course, that is a rather remote thing, because the hearings before the Naval Committee developed the fact that only one vessel, the *Hood*, has been completed, and that the three others of that class have been canceled and that that is the only vessel of that character afloat.

Gen. COE. Yes, sir; it is the only one of Great Britain's.

The CHAIRMAN. And Japan has one?

Gen. COE. Yes, sir.

The CHAIRMAN. There are only two in the world. Now, we would hardly be warranted in changing entirely our coast defenses because there are two vessels in all the world that might come within gunshot of our coast and at the same time be out of range of our coast guns.

Gen. COE. Mr. Good, I did not intend to cite those two vessels as being the only ones of that general class which are in existence, because there are a great many. The *Hood* is simply the latest type

superdreadnought. The British have in existence to-day a fleet of 16 that are not materially different.

The CHAIRMAN. You include some of the guns on vessels like the *Queen Elizabeth* and vessels of that class?

Gen. COE. Yes, sir.

The CHAIRMAN. They were operating against the Dardanelles for several weeks and finally gave up the job and sailed away.

Gen. COE. Yes, sir.

The CHAIRMAN. They could not reduce even the fortifications at that place and I understand that the fortifications at the Dardanelles can not be compared, or never could be compared in efficiency, with the well-fortified places in the United States.

Gen. COE. The Dardanelles were fairly well fortified, and I think will compare favorably with any of our fortifications. Of course, they had guns there that were mounted by the Germans subsequent to the outbreak of the war. They had six 14-inch guns and seven 15-inch howitzers. We have not any 15-inch cannon anywhere in our fortifications. We have one 16-inch and twenty-four 14-inch in all of our coast defenses.

PROJECTILES, EFFECTIVENESS OF.

The CHAIRMAN. General, you have spoken about the ineffective projectiles for our guns at fortified places. The guns themselves are so constructed that a more effective projectile could be used?

Gen. COE. Oh, yes; it is only a question of ammunition supply.

The CHAIRMAN. That would not necessitate doing away with the guns?

Gen. COE. No, sir; not at all.

The CHAIRMAN. And are we manufacturing a more effective projectile than those?

Gen. COE. We are now; yes. That is another case where we got much better action by joining hands with the Navy. The Navy had a better projectile than we had, and they were anxious for our support in insisting upon manufacturers meeting their requirements, and by joining hands with them we have made great advances.

Mr. SLEMP. General, your thought is that the fortifications themselves will not be reduced in all probability by an attacking fleet, and therefore it comes to the point of keeping the enemy vessels at such distance at sea that a shot from them will not fall on a city, for instance, like New York.

Gen. COE. Keeping them at such distance that they can not come to anchor outside of the range of our guns.

Mr. SLEMP. You used New York City as an example?

Gen. COE. Yes.

Mr. SLEMP. New York City is about 12 miles inland from the fortifications, so that a gun down along the seacoast would have an advantage of 12 miles over a vessel out at sea?

Gen. COE. Yes.

Mr. SLEMP. So you get that much additional protection so far as the city is concerned?

Gen. COE. Yes.

Mr. SLEMP. And that would be met again by your 14-inch gun and I think by the 12-inch gun?

Gen. COE. No, sir; not the 12-inch. It might be met as far as range alone is concerned by the 12-inch on a long range carriage, but I do not think the 12-inch would meet the situation in that case on account of the importance of the target and because it is not powerful enough when it does get a hit.

EMPLOYMENT OF MINES.

Mr. SLEMP. Just one other point: Is there any means developed for keeping vessels out to sea through mines?

Gen. COE. Yes, sir; but when you do that, you shut out your own vessels from the harbor. You may mine the sea-way in front of any harbor, but it is, of course, dangerous to your own vessels. The controlled mine can only be planted a short distance from shore, and that is generally done for the purpose of closing a channel—that is you can open it or close it as you please.

The CHAIRMAN. Now, without going into the details, under the board of review project, there were twenty-six 16-inch rifles. How many of those have been completed?

Gen. COE. Thirteen are under construction.

The CHAIRMAN. Are any of them completed?

Gen. COE. No, sir.

The CHAIRMAN. When do you expect deliveries?

SIXTEEN-INCH GUNS AND MORTARS—DELIVERY DATES.

Gen. COE. I have a table: One in February, 1920; one in April, 1920; one in June, 1920; one in August, 1920; one in October, 1920; one in December, 1920; one in February, 1921; one in April, 1921; one in June, 1921; one in August, 1922; one in October, 1922; one in December, 1922, and one in February, 1923.

The CHAIRMAN. How about the 16-inch mortars? How many of those have been completed and delivered?

Gen. COE. None.

The CHAIRMAN. When do you expect deliveries of them?

Gen. COE. We expect deliveries as follows: One in June, 1920; two in July, 1920; two in August, 1920; two in September, 1920; two in October, 1920; two in November, 1920; and two in December, 1920.

The CHAIRMAN. There were provided thirty-six 12-inch long-range guns. All of those have been contracted for, have they not?

Gen. COE. Yes, sir; they are all under construction, either completed or nearing completion. There is a small item in the estimate for completing that work.

The CHAIRMAN. There were two 12-inch howitzers?

Gen. COE. Yes, sir; both of them have been completed.

The CHAIRMAN. And twenty-five 6-inch guns?

Gen. COE. Nothing has been done on them.

The CHAIRMAN. How about the 4.7-inch gun?

Gen. COE. Nothing has been done on that.

The CHAIRMAN. And four 3-inch guns?

Gen. COE. Nothing has been done on them.

The CHAIRMAN. You have a lot of guns of that same character?

Gen. COE. We have a lot of 3-inch guns. We built certain 3-inch antiaircraft guns during the war, which were undoubtedly in the

mind of the board of review at the time that report was made. Some of them were used in France.

Mr. SLEMP. The 16-inch mortars have been ordered and contracted for?

Gen. COE. Yes, sir.

Mr. SLEMP. The delivery of these guns will depend, in the final analysis, upon the number of men kept working in the arsenals?

Gen. COE. Yes, sir; undoubtedly.

Mr. OGDEN. Is the present type of armament sufficient for the coast defense, as long as the Navy remains intact?

Gen. COE. Not unless it is supplemented with higher-powered weapons; because the higher-powered and longer-ranged guns that we are recommending—for example, the 14-inch guns for which we are asking carriages—protect the naval bases, and if any base is destroyed while the Navy is somewhere else, it means that its power of offensive action is reduced.

Mr. OGDEN. The purpose of the enemy warcraft may be discovered in sufficient time to enable our Navy to meet the situation.

Gen. COE. Yes, sir.

Mr. OGDEN. And, in that event—

Gen. COE (interposing). Perhaps I might give my idea to you in the form of a concrete case: Suppose our Navy is at either Narragansett or Guantanamo, or, at any rate, is not at Hampton Roads; at the present time there is no Navy at Hampton Roads except such vessels as they have left there consisting of, perhaps, monitors and some submarines: Now, with the present armament at Hampton Roads, if a hostile Navy, well protected by destroyers from submarine attack, desired to do it, it could destroy the naval base without coming under the fire of our guns. That is not adequate protection. Now, the Navy, we will say, is at Narragansett, and it comes out to meet the hostile fleet on the sea, and, perhaps, it defeats it, more or less, indecisively, off the Capes. Then, it is very desirable to go to the base at Hampton Roads, but it finds that the base has been destroyed, and that, of course, diminishes very much its offensive power.

Mr. FRENCH. A little while ago you stated that a project should be completed before other projects are begun. This is my first experience on this subcommittee, and I was interested in knowing just what a project is. I thought I knew but from your statement a while ago, I thought that, perhaps, I did not know.

Gen. COE. If you will take this sheet [indicating] you will see that we have in here a project for certain 16-inch guns. The guns are under manufacture and will be completed early during the next fiscal year. The carriages are also under manufacture, and we are asking for a certain appropriation for the installation of those carriages. We are also asking a considerable item, which amounts to \$4,000,000 for the ammunition for those 16-inch guns, and that is why I say that that is an important thing to consider. It seems to me that it should be gone into ahead of any other new project; that is, we should provide ammunition for the guns that we are building now. Of course, they are useless without ammunition. The same thing is true with respect to the fire-control installation for the guns. All of those items go to make up a complete project.

Mr. FRENCH. You were referring to a gun project with reference to the 16-inch guns, and not to any project with relation to any particular point?

Gen. COE. That is true.

MONDAY, MARCH 22, 1920.

STATEMENT OF BRIG. GEN. H. M. LORD, DIRECTOR OF FINANCE.

REVISED ESTIMATES.

Mr. SLEMP. Gen. Lord, do you desire to make a statement?

Gen. LORD. Mr. Chairman, I wish to present very briefly the revised estimates, charts of which you are being provided with. They will show in the first column the general objects divided into certain sections; first, expenditures or estimates for continental United States; second, for the insular possessions; and, third, for the Panama Canal. Column No. 2 will show the total appropriation for the current fiscal year, amounting to \$10,659,291. The third column will show the estimates for 1921 as presented in the Book of Estimates, which are the estimates officially before the committee. Column No. 4 will show the revised requirements. The estimates carried in the Book of Estimates make a total of \$117,793,336; the revised requirements submitted under direction of the Secretary of War reduced the total amount to \$66,294,114, the total reduction being \$51,499,216. This reduction is distributed under the territorial sections as follows:

The amount estimated for continental United States is reduced by \$37,438,646; the total estimates for the insular possessions are reduced by \$362,716, and the total estimates for the Panama Canal are reduced by \$10,433,210.

The reduction by bureaus which have appropriations under the bill is as follows: The Engineer estimate is reduced by \$927,192; the Ordnance Department reduces its estimate by \$47,395,866; the Construction Division estimate is reduced by \$317,968; the estimate of the Air Service is reduced by \$1,375,808; the estimate of the Coast Artillery is reduced by \$1,480,382. The appended sheets carry the same territorial separations, beginning with continental United States, giving the itemized estimates all the way through, comprising all the items in the bill. The Engineer estimate will be supported by Col. Sherrill, who is here for that purpose.

LIFE OF APPROPRIATIONS.

There is one bit of general legislation which I wish very briefly to call to the attention of the committee: Prior to March 3, 1919, the appropriations carried in the fortifications act were no-year appropriations, all funds being available until expended, but under the act approved March 3, 1919, the current fortifications act, the following provision was inserted:

SEC. 5. That appropriations for fortifications and other works of defense, for the armament thereof, and for the procurement of heavy ordnance for trial service, heretofore made in fortifications or sundry civil appropriations acts,

shall not be available for obligation after June 30, 1920, and all unexpended balances of such appropriations which remain upon the books of the Treasury Department on June 30, 1921, shall be covered into the Treasury and carried to the surplus funds.

SEC. 6. That estimates of appropriations for fortifications and other works of defense, for the armament thereof, and for the procurement of heavy ordnance for trial and service shall be submitted to Congress in the Book of Estimates for the fiscal year of 1921 and the fiscal years thereafter upon an annual basis. * * *

This provision promises to make for the Engineer Corps, the Ordnance Department, and for the Signal Corps, a great deal of trouble. I will not enter into a discussion of this in detail, but I will only present it to the committee as a whole. Col. Sherrill, for the Engineer Corps, and Gen. Rice, for the Ordnance Department, will present their particular troubles to the committee as they appear before you. However, I will offer one illustration of it: The Ordnance Department, we will say, has a project, and it issues an arsenal order to some particular arsenal for the carrying out of that project, estimating for an appropriation to meet the amount that would be required to complete it. It is impossible in most cases to complete a project of that character within one fiscal year. The appropriations being annual rather than no-year appropriations, it is impossible to incur obligations on that project after the close of the fiscal year for which the money is appropriated. Gen. Rice and Col. Sherrill will submit provisions that will meet that need.

There has been carried in the reorganization bill for the Army as it recently passed the House of Representatives the following provision, and I am inserting it so that the committee may have it before them for consideration. This is taken from page 4463 of the Congressional Record of March 10, 1920, inasmuch as I have not a copy of the bill as it passed the House. This will give the provision as it is carried in the bill. Referring to the Assistant Secretary of War, who has been made really the chief of munitions, it says:

He shall cause to be manufactured or produced at the Government arsenals and Government-owned factories of the United States all such supplies or articles needed by the War Department that said arsenals and Government-owned factories are capable of manufacturing or producing: *Provided*, That the cost of manufacturing or producing such articles or supplies at said arsenals and Government-owned factories shall not exceed the cost if purchased in open market. And he shall operate or cause to be operated in said arsenals and Government-owned factories economically. And all orders for manufacture of material pertaining to approved projects which are placed with arsenals and Government-owned factories, or other ordnance establishments shall be considered as obligations in all respects in the same manner as provided for similar orders placed with commercial manufacturers.

The intent of that legislation would be to make an arsenal order, for example, a contract, so as to hold available the money that has been estimated for by the War Department and approved by the Assistant Secretary of War as necessary for that particular project. This would seem to meet the need of the Ordnance Department, and it also covers similar work done by the Quartermaster Corps and other supply bureaus of the War Department; but it does not relieve the situation so far as the Engineer Corps is concerned in the

construction of emplacements and work of a similar character. I simply wish to present that situation to the committee, because that matter will be brought up by the representative of the Chief of Engineers and by the representative of the Chief of Ordnance.

Mr. SLEMP. It seems to me that we should go into that when we come to the consideration of those particular items later.

Gen. LORD. Inasmuch as it has reference to both the Chief of Ordnance and the Chief of Engineers, and, also, I might say, to the Chief of Signal Corps, I thought it wise to put it before the committee as a matter for general consideration in connection with the bill.

Mr. SLEMP. The estimates we should consider are based upon what is here submitted in this sheet?

Gen. LORD. Yes, sir; rather than what is printed in the Book of Estimates.

Mr. SLEMP. I asked you some time ago if you would give us a general statement covering the expenditures of money thus far in this fiscal year under the various heads. I suppose you will be ready to supply that information.

Gen. LORD. Yes, sir. The various bureaus concerned will be represented in the hearings. Maj. F. W. Browne, of the finance service, will represent me here during the hearings.

Mr. SLEMP. There is one other point that I would like to take up. Inasmuch as there are no obligations to be incurred under previous appropriations after June 30, 1920, will you not be able to turn back a considerable sum of money?

Gen. LORD. All of that information has been compiled, and, so far as the Ordnance Department is concerned, Gen. Rice will have that information. If, during the discussion, anything else comes up in the way of balances of appropriations, etc., we will be glad to furnish the information.

The CHAIRMAN. In making this revised estimate, was it made on the theory that you would make larger demands than previously anticipated upon some of the money already appropriated for the purposes originally estimated for?

Gen. LORD. Do you mean in these estimates?

The CHAIRMAN. Yes; you have a revised estimate appreciably reducing the original estimates. What was the basis of that? Was it done by cutting out a great many things that had been estimated for?

Gen. LORD. By cutting out projects and modifying projects.

The CHAIRMAN. Was it based upon the theory that the provision of law in the fortifications act that you have just read might be repealed, thus permitting you to use some money that had already been appropriated?

Gen. LORD. No, sir; that revision was made entirely independent of any prospect of that sort.

Mr. SLEMP. You did not think it wise to ask for the appropriation of the sums originally estimated?

Gen. LORD. This estimate is based on the revised requirements.

Gen. COE. That was made by the General Staff in consultation with the Chief of Ordnance, the Chief of Engineers, the Chief of Field Artillery, and the Chief of Coast Artillery.

MONDAY, MARCH 22, 1920.

ENGINEER DEPARTMENT.

STATEMENTS OF COL. C. O. SHERRILL, IN CHARGE OF FORTIFICATIONS, OFFICE OF CHIEF OF ENGINEERS, AND CAPT. CRESWELL GARLINGTON, ASSISTANT.

Mr. SLEMP. What position do you occupy in the Government service?

Col. SHERRILL. I am colonel in the Corps of Engineers and assistant to the Chief of Engineers in charge of the section of his office which handles fortification matters.

Mr. SLEMP. And you are in charge of presenting the reasons for the estimates for engineering to the committee?

Col. SHERRILL. Yes, sir.

LIFE OF APPROPRIATIONS.

M. SLEMP. You are asking for \$2,900,000 for gun and mortar batteries in the United States?

Col. SHERRILL. For battery construction; yes, sir. May I submit another proposition before that comes in; something that is an amendment to the enacting clause and which, I believe, has been submitted to your committee before? The present wording of the bill, which limits the fund appropriated for a single fiscal year, very much handicaps the Engineer Department as well as other departments, but especially the Engineer Department and the Ordnance Department, in getting work efficiently and economically done in that the funds expire exactly in the middle of a working season and it, therefore, makes it necessary, to a large extent, to break up our working parties and disorganize the work at a time when we ought to be going ahead full blast. Heretofore the funds for fortification work have been made under a no-year appropriation, which made those funds available until expended. The Chief of Engineers, the Chief of Ordnance, and other bureau chiefs request that the following wording be inserted in the enacting clause:

Provided, That appropriations for fortifications and other works of defense, for the armament thereof, and for the procurement of heavy ordnance for trial and service, made in this or any future fortification or sundry civil act shall be available for a period of two years from the beginning of the fiscal year to which the act pertains, and the fortifications act approved March 3, 1919, is hereby amended accordingly.

Mr. SLEMP. The effect of that amendment would be to make it a two-year appropriation instead of a one-year appropriation?

Col. SHERRILL. Yes, sir; except that the estimates would be submitted annually but the appropriation would run over during the following year in order that we would not have the work broken up, as I indicated just now. The Signal Corps, the Engineers, and Ordnance are all interested, and Ordnance is rather anxious to have some provision placed in the bill which will also make the placing of an order with one of their own arsenals have the effect of a contract; this does not include that and it lets the appropriation run for two years,

so that during that time they could be working under their funds, but there would be no special provision which would make an order on an arsenal a contract.

Mr. BYRNS. The work of the Engineer Department is done by contract?

Col. SHERRILL. No, sir; and I will explain why we wish this: The work of the Engineer Department, as a rule, is done by contract on river and harbor work, and works of that nature, but not on fortification work; on account of its confidential and secret nature we usually do that by hired labor, which makes it impossible to obligate funds after the end of the fiscal year.

Mr. BYRNS. For that reason a general authorization would not serve your purpose?

Col. SHERRILL. No; that is the reason we want it extended over, so that this day labor work could proceed uninterrupted.

Mr. SLEMP. On that point, why is it you can not, under any circumstances, come back to Congress each year for the specific amount you want to spend for the following year? For example, suppose you are working on a two, three, or five year program; that is, it takes you five years to complete a project; you ask for so much money this year and then you ask for so much money the next year, the following year, and so on?

Col. SHERRILL. Yes; that is what we contemplate doing.

Mr. SLEMP. Why would you want to run it over for two years?

Col. SHERRILL. The minimum we would like to run it over is according to the provision we have in the Army bill for mapping, and the minimum that would be necessary for us would be six months.

Mr. SLEMP. You would not ask for more money?

Col. SHERRILL. No; we would carry that money over for six months longer. In this bill, the money we would get would run over until December following next July.

Mr. SLEMP. What I think is at the bottom of your proposition is that you have great fear that the succeeding Congress will not carry out the project of the preceding Congress?

Col. SHERRILL. For instance, we might not have the bill passed early enough to prevent us from completely disorganizing our force.

Mr. BYRNS. As I understand, your proposition is this: That whenever an appropriation is made in the fortification bill a situation may arise during the fiscal year on account of weather conditions, etc., which would prevent you from making an expenditure of the full amount appropriated?

Col. SHERRILL. Yes, sir.

Mr. BYRNS. You simply want authority to continue the work after the expiration of that fiscal year under the appropriation previously allowed?

Col. SHERRILL. Yes, sir.

Mr. BYRNS. And to expend the money that is unexpended?

Col. SHERRILL. That is it.

Mr. SLEMP. That same proposition, however, can be met by year to year appropriations.

Mr. BYRNS. Undoubtedly it could be met in that way.

Mr. SLEMP. The question is whether the committee wants the War Department to come before it every year and state the status of its

projects, how far it has gotten along with its work, how much money it has expended in that particular year, and how much money is needed for the next year?

Col. SHERRILL. We propose to make annual estimates, but in case of unforeseen conditions this would allow us to go ahead for a few months longer. If the appropriation act were passed two or three months ahead of July 1 each year we would be perfectly satisfied, but you can see that as we approach the end of the fiscal year we have to make arrangements to turn in funds; we can not run along at full blast, we must begin to draw in our forces, which is very demoralizing on our forces in the field. Let me cite something in reference to the time it takes to get money out in the field under this centralized finance from which we are suffering now; it takes some two or three weeks to get a notice to a field officer so that he can begin to spend money after we have gotten approval of the project; that ties us up hopelessly because it means that much time less to get the work done. The whole object of the engineer department in advocating such an amendment as this is simply on the ground of economy; that is all; it has absolutely nothing to do with the amount of money we will spend.

Mr. SLEMP. I do not see the economy. It is now March 22, and we will pass the bill very soon, so that I do not see any difference in your situation. What is the difference in your position if the appropriation is made early enough for the coming year than if it is appropriated for two years?

Col. SHERRILL. None whatever, if it comes early enough to avoid restricting our forces.

Mr. BYRNS. Why would it be necessary to restrict your force in anticipation that Congress might possibly not make the appropriation in time? In other words, you would run until June 30, and if you did not have the money you would shut down?

Col. SHERRILL. That would be true; but in operating any field office there are a great many things to consider, one of which is the employees. What are you going to do with them? Are you going to discharge those employees or are you going to carry them on?

Mr. BYRNS. I can appreciate the effect upon your force when there is uncertainty as to whether or not they will be employed after June 30.

Col. SHERRILL. We can not obligate a cent under the day-labor arrangement after the 30th of June, but if we were operating by contract we could. I wish to say that under this provision it would be quite satisfactory to allow the use of the funds six months after the end of the fiscal year, but to the Ordnance Department it is of very vital importance to carry it over for two years; so that before you come to any decision I should like to have Gen. Rice make a statement to you, because it is of very great importance to him, much more so than to us. Ours is only to tide us over for that little period, and whether you do it by passing your act early or in this way is immaterial, but the Ordnance Department is very much more tied up.

Mr. SLEMP. I think, if it is agreeable to you gentlemen, we would better take this matter up when we consider the general provisions.

GUNS AND MORTAR BATTERIES IN THE UNITED STATES.

You asked in 1920 for \$730,000, and the committee gave you \$380,000. What is the state of your balances?

Col. SHERRILL. The first item is for the construction of gun and mortar batteries. The unexpended balance on December 31, 1919, under that appropriation was \$830,999.37, and an unallotted balance of \$1,602.37; in other words, the larger sum was in the hands of the various districts for expenditure, so that there is a total available of \$832,601.74. It is estimated that none of that sum will lapse at the end of the fiscal year; of course, that is an estimate based on what is being expended, or pretty closely related to what they expended, in the previous portion of the year. In other words, the estimated expenditure of that sum would be \$832,601.74. The amounts previously withdrawn by Congress, \$2,000,000, by the act of July, 1918; Fort Tilden, \$1,000,000, and Cape Henry, \$1,000,000. Those withdrawals were made on account of war conditions, and during which time only a limited amount of fortification construction work was being carried on by the Engineer Department, so that those funds were withdrawn.

Mr. SLEMP. You have no balance, except \$1,602.37, of all the money you have had in your hands?

Col. SHERRILL. That is the unallotted balance, but we had on December 31, under the head of gun and mortar batteries, \$832,601.74 unexpended.

Mr. SLEMP. Do you expect to expend that during this fiscal year?

Col. SHERRILL. Yes; up to June 30.

Mr. SLEMP. So on June 30—

Col. SHERRILL (interposing). We will have nothing to turn back.

Mr. SLEMP. The books will be closed?

Col. SHERRILL. Yes, sir; that is according to our estimate and, of course, that is only one item of gun and mortar batteries. Of the \$2,900,000 estimated for 1921 it is proposed to use \$2,500,000 for new projects and \$400,000 for existing work. A new project in that connection is not intended to mean a new project in the sense that it has not been authorized by Congress or has not been approved by the War Department, because, I might say here, that every item the engineer department has put into this bill has had formal approval of the War Department after consideration by the War Plans Division, Chief of Coast Artillery, and Chief of Engineers, and, as necessary, by the Chief of Ordnance. It can be accepted that every item has been approved by the War Department and that we have not put in any other estimate.

Mr. SLEMP. Of how late a date was that approval?

Col. SHERRILL. These various estimates cover items that were approved at different times. For instance, the construction of some one mining casemate will be approved after thorough investigation has been made; the War Department will say, "That is approved and you put in an estimate for it." That may happen on almost any date and those things occur at different dates. The Engineer Department does not put in any estimate without the approval of the War Department. In other words, we are submitting estimates for carrying out the regularly approved plans and projects of the War

Department all the way through. This particular new construction is for carrying out a project which I can read to you in a few minutes. It is for the construction of 16-inch gun and 16-inch mortar emplacements and the completion of the 12-inch gun emplacements. I can give you the complete details of all those.

Mr. SLEMP. I wish you would state what has been done with the money during this fiscal year and the condition of the various projects?

PORTLAND, ME. (FORT LEVETT), PROJECT.

Col. SHERRILL. Going ahead with a statement of work accomplished, I will go right down the coast line, starting at Portland, Me. At Portland, Me., there are under construction two 12-inch long-range batteries at Fort Levett; these are practically completed and the armament is mounted. The estimates provide for \$10,000 for the absolute completion of those two batteries; in other words, they are almost entirely completed.

Mr. SLEMP. With regard to that matter, you stated in the hearings before that this work was about done and you asked \$70,000 to complete the batteries then?

Col. SHERRILL. You see, the \$70,000 indicates that they could not have been practically complete because the total cost has been \$339,000 and \$70,000 would be quite an item of that work; it is now practically completed but there is a certain amount of finishing yet to do, trimming up, etc. We only ask for \$10,000 for that.

Mr. SLEMP. For next year?

Col. SHERRILL. Yes, sir. There are a great many small items that have to go in near the end in connection with wiring, finishing, completing the sand fill, grading the slopes, and various other things like that. So that this item of \$10,000 is supposed to take care of them.

Mr. BYRNS. Where is that?

Col. SHERRILL. This is at Portland, Me., at Fort Levett.

BOSTON AND HOG ISLAND PROJECTS.

The next item is at Boston or, to be specific, at Nahant, where there are two 12-inch rifles 42 per cent completed; then there are two 12-inch rifles at Hog Island, where the preliminary work is in progress; the wharf is 60 per cent complete; that is the wharf necessary on this island for getting out the material for this battery. The items at Nahant and Hog Island are the largest items included in the estimates of this year.

Mr. SLEMP. How much have you spent on this project during this year and how much will you expend?

Col. SHERRILL. We have made total expenditures to date on these works, as follows, \$255,723.98 at Nahant and \$75,953.49 at Hog Island. Those are the total expenditures on those two items. We have that stated separately by different items.

Mr. SLEMP. The point I make is this: You made the statement a year ago that you estimated that \$400,000 would complete the project.

Col. SHERRILL. The estimate for Nahant was \$501,000, plus \$400,000 at Hog Island, making \$900,000. Now, we are asking out of that

total of \$900,000, \$280,000. This is not for the \$400,000 item. The total expenditures to date at Nahant and Hog Island are \$331,677.47 out of a total estimate of \$901,740.

Mr. SLEMP. You propose to complete these batteries in what length of time?

Col. SHERRILL. In this coming fiscal year and next.

Mr. SLEMP. In two more years?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. Are you proposing to install any other guns in this section or at Boston?

Col. SHERRILL. We have two 16-inch guns proposed for Calf Island, Boston. That is in the board of review project, and we will take that up later.

Mr. SLEMP. Does the Chief of Coast Artillery favor continuing the completion of these 12-inch batteries?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. Under these circumstances?

Gen. COE. Yes, sir. The 16-inch guns are already provided for.

NEW BEDFORD, MASS. (FORT RODMAN), PROJECT.

Col. SHERRILL. The next is New Bedford (Fort Rodman), two guns, at an estimated cost of \$338,184.03; funds allotted, same amount; concrete completed; earth cover, 95 per cent completed; water supply and plumbing, doors and windows, 95 per cent completed; lighting, 75 per cent completed; mounting of armament, completed except for motors on carriages. There is an estimate of \$10,000 to complete those emplacements.

Mr. BYRNS. Are you finding it possible to complete those batteries under the original estimates?

Col. SHERRILL. Not under the original estimates.

Mr. BYRNS. Or within the original estimates?

Col. SHERRILL. No, sir; not within the original estimates made before the war, because the prices have changed so much.

Mr. BYRNS. I want to know how much more they are costing, approximately.

Col. SHERRILL. We have the figures on that. These estimates where it says here "estimated cost" do not, as I take it, refer to the original estimates put in before the battery was commenced, but this estimate has been before Congress before.

Mr. SLEMP. Gen. Winslow's statement in regard to this item last year was as follows:

At New Bedford, the district officer at this time has about \$35,000 in his hands, and \$100,000 more is estimated to complete that battery. It can easily be completed entirely during the fiscal year if we get the funds.

Col. SHERRILL. Well, it is fairly well completed, except for this small amount of \$10,000 for finishing it. It is a very small item, and you might say it is contingent. For instance, installing the wiring in the battery is not quite finished. Windows and doors are reported 95 per cent completed. It is quite possible that all of this work will be done by June 30, and that this money will be turned back. It is only where these items may not be completed that we have asked for a small sum to cover contingencies.

Mr. SLEMP. It is just possible that it will be required?

Col. SHERRILL. Yes, sir; it is not at all certain, but we have to cover that contingency.

Mr. EAGAN. Do I understand that you can finish the work with the amount already appropriated, but that on June 30 you may have to turn some money back, and that this is really asking for a reappropriation of \$10,000?

Col. SHERRILL. Yes, sir; this is to take care of small amounts of work that we estimate will not be finished.

Mr. EAGAN. I do not see how you could finish it for the exact amount of money estimated. You could not estimate as closely as that?

Col. SHERRILL. No, sir.

Mr. SLEMP. Have you anything in Narragansett Bay?

NEW YORK, N. Y. (FORT HANCOCK), PROJECT.

Col. SHERRILL. Not under this item. We are only taking up the 12-inch batteries now.

The next item is four 12-inch guns at Fort Hancock, at a cost of \$31,100. The construction is completed, and the batteries are being prepared for formal transfer to the troops. We ask for no appropriation there.

Mr. BYRNS. How much was expended there?

Col. SHERRILL. We have expended relatively little there during the year. It has just been a matter of finishing up.

Mr. SLEMP. Are the guns mounted on barbette carriages or disappearing carriages?

Col. SHERRILL. All of these guns are on barbette carriages, for long-range fire.

DELAWARE RIVER (FORT SAULSBURY) PROJECT.

The next item is Fort Saulsbury, Delaware Bay, four 12-inch guns, at an estimated cost of \$754,080. The construction is 95 per cent completed and the armament mounted. We estimated that we could possibly do that with the funds now available, and we submit no estimate for that.

PENSACOLA, FLA. (FORT PICKENS), PROJECT.

The next item is Fort Pickens, Pensacola, Fla., two guns, at an estimated cost of \$310,378. The state of the work is as follows: Wharf and channel completed; concrete for gun wells and platform completed; other concrete work 98 per cent completed; filling and sodding completed. The construction of this battery has been somewhat delayed, due to damage to construction plant by storm of September, 1917. We are asking here \$10,000.

GALVESTON, TEX. (FORTS CROCKETT AND TRAVIS), PROJECTS.

The next is Galveston, Fort Crockett and Fort Travis, four guns, at an estimated cost of \$482,301.21. The gun wells and platforms have been completed; the concrete work is completed; the electrical

work is 95 per cent completed, the back fill is completed, and the grading completed, and the surfacing is 90 per cent completed.

Mr. SLEMP. That is as of what date?

Col. SHERRILL. As of December 31.

Mr. SLEMP. You practically will complete the project this fiscal year?

Col. SHERRILL. Yes, sir. For the same reason as I stated above, we ask \$15,000 for those four guns. Two are at Fort Crockett and two at Fort Travis, and we are asking \$7,500 for each of those two emplacements.

Mr. BYRNS. In regard to that last project, I understood you to say that a certain part of the work was 98 per cent completed, with other parts probably 90 per cent completed, or something of that sort, as of December 31: Now, you are asking for \$7,500 for each one of those batteries. Does that mean that there will be practically no work done on those batteries?

Col. SHERRILL. No, sir; we are going right on with that work. For instance, we frequently have great delays in getting small items of very special technical equipment. There may be some items that go in the mining casemates or switchboard, and if we can not get them that will hold up other things. The Ordnance Department, Signal Corps, Engineers, and other services have to meet together with the work, and while we may be ready with our part of the work we must all meet together with our particular requirements before we can finish the entire work. For instance, the Ordnance Department has its motors on the gun mounts, and they must have them there before we can connect up the power for them.

Mr. BYRNS. Will you complete that project within the last estimates made?

Col. SHERRILL. Yes, sir.

Mr. BYRNS. Will you complete it within the estimates last submitted, or does not this mean an increase over the amount of the original estimate?

Col. SHERRILL. We have not that information in shape where we can readily get at it. This estimate I am giving is our estimate of the cost now at this time. I have not the original estimate, but I know that the cost of all these installations is larger than the original estimates.

SAN FRANCISCO, CALIF. (FORT BARRY), PROJECT.

Col. SHERRILL. The next item is San Francisco, Fort Barry, two 12-inch guns, under construction, estimated at this time to cost \$342,530. The construction of this battery was originally limited to the gun platforms, being intended to conduct a test of the ammunition service based on the utilization of magazines of adjacent batteries at Fort Barry. Upon completion of the platform the test was had, and the conclusions drawn that the method of ammunition service was unsatisfactory. Funds for the construction of the magazines at this battery were accordingly allotted July 22, 1919, and this work is now in process. We are asking for \$75,000 largely to complete the magazine. In explanation of that, I might say that the question has been frequently asked as to why we built these extensive emplace-

ments. In other words, by complete emplacement is meant the gun platform, which is the fundamental essential, and then, in addition to that, the ammunition service. That includes bomb-proof, protected magazines, and it includes, also, facilities for getting shells and the powder promptly to the guns. It was maintained that a lot of that auxiliary service was unnecessary, and we tried it out by building these batteries at Fort Barry without any of the facilities or magazines. After the test it was decided that it was not a success, and so we were called upon to build those magazines and provide the ammunition service. The theory on which it is worked out is this, that if you can save the upkeep of one soldier by perfecting your mechanical appliances in the battery, you save about \$1,000 a year in running the battery. That, when worked out, allows a pretty big item of cost.

Mr. SLEMP. What is your judgment about this experiment in the building of these magazines there? Was that a mistake or was it justified?

Col. SHERRILL. I think it was a mistake to build them and leave the facilities out.

Mr. SLEMP. To build them instead of using places under the platform for ammunition?

Col. SHERRILL. It is a subject to which I have given a great deal of thought. I was in charge of the construction of the fortifications at the Panama Canal when we started building probably the first two of those 12-inch long-range rifles that were built, and there we gave a great deal of thought to the character of the emplacements. There were a number of officers there who held that we should not spend so much money on emplacements, but should rather make a small platform and improvise methods for supplying the ammunition; but a thorough investigation of that leads to the belief that it is more economical to put money into better facilities and economize in men, rather than to put down a gun platform and take four or five times as many men to get the ammunition up to the gun. At Fort Barry, after consideration by a board of Artillery officers, they were very much opposed to doing away with the improved ammunition service. That question to my mind, however, has not been absolutely settled, because there are other methods which may be applied as a substitute for that.

For instance, the experience of the war indicated that it might be possible, instead of building bomb-proof protected magazines, to make a wide dispersion of your shelters, so that no one shell would destroy more than one of them. If any of you were in France you observed along the roads small piles of shells widely spaced and without any protection whatever, so that if an enemy bomb struck one it would destroy all that pile, but not do any other damage. We are studying something approaching that in the seacoast defenses, but we have nothing worked out to date to submit to you.

Mr. SLEMP. Is this the only place at which you have built magazines for the use of ammunition in fixed emplacements?

Col. SHERRILL. No, sir. We have built them at every one but this is the only one from which we omitted them, and after we omitted them we tried to improvise a method of getting up ammunition by

means of trucks, and after trying it out it was reported against so strongly that the War Department, on the recommendation of the Chief of Artillery, asked us to go ahead and build the magazines, putting in the regular approved service. I am not, nor is the Chief of Engineers, committed to this system, and we contemplate investigating further the possibilities of dispersing our supplies of ammunition and bringing them up on light railways to the guns, so as to obviate a great deal of this protection around the battery. That, however, has not been determined.

Mr. OGDEN. Do I understand that \$400,000 will be sufficient to complete the emplacements for the 12-inch guns?

Col. SHERRILL. Yes, sir. Everywhere except at Nahant, and it is only for the year's work that \$280,000 is required for that. There will be a small amount additional required for Nahant, about \$20,000, in the succeeding year for finishing up.

Mr. SLEMP. This is another case where you thought you would get through with the amount of money on hand. This is a question which was asked by Mr. Good at last year's hearings:

I take it that the amount you are asking, \$730,000, with the allotted balances, and your \$489,000 of unallotted balances, will complete all of this work?

Gen. WINSLOW. That is our understanding and that is our present estimate.

Col. SHERRILL. In that connection, those funds last year were, on the order of the War Department and in accordance with the approved project, diverted to the construction of a 16-inch emplacement at Fort Michie. That accounts for that difference and, as you know, there has also been an increase in cost right along.

Mr. SLEMP. Then, as that project stands, you will need \$75,000 for this fiscal year with which to complete it?

Col. SHERRILL. Yes, sir; for the Fort Barry item. We have started, as you know, on the 16-inch emplacement for the last 16-inch gun on a disappearing carriage. That is being built at Fort Michie and that took up most of the fund you are speaking of. I might say that most of this work on 12-inch emplacements would have been finished except for the fact that it was held up during the war for several reasons, one of which was the difficulty of securing labor, but mainly because it was not considered desirable to compete with war activities for securing labor at a great many of these places.

Mr. SLEMP. There is nothing at Columbia River and nothing at Puget Sound?

Col. SHERRILL. No, sir.

Mr. SLEMP. That disposes of the 12-inch gun batteries and the emplacements. Are you putting in any emplacements for guns of less caliber than 12 inch?

Col. SHERRILL. No, sir. The War Department has gone almost entirely to mobile armament with the intermediate and minor caliber coast-defense guns, and we are using those guns that were sent back from France, largely the 155-milimeter French guns.

Mr. SLEMP. Are you building any emplacements for 14-inch guns?

Col. SHERRILL. No, sir.

Mr. SLEMP. You are building an emplacement for one 16-inch gun?

Col. SHERRILL. Yes, sir; at Fort Michie.

Mr. SLEMP. That brings your present work up to date, does it not?

ANTIAIRCRAFT EMPLACEMENTS.

Col. SHERRILL. Yes, sir. However, I have not touched on the matter of antiaircraft emplacements.

Mr. SLEMP. Is that under this appropriation?

Col. SHERRILL. It is under this appropriation; yes, sir; antiaircraft defense. I have a complete statement about two pages long as to antiaircraft work during the war. Would you care to have that read?

Mr. SLEMP. My recollection is that you made a complete statement about that a year ago.

Col. SHERRILL. There is nothing contemplated in that connection now.

Mr. SLEMP. Have you expended any money this year on antiaircraft defenses; if so, how much and where?

Col. SHERRILL. No, sir; nothing has been expended this year.

Mr. SLEMP. Are you asking for any money for that purpose next year?

EMPLACEMENTS FOR 16-INCH GUNS AND HOWITZERS.

Col. SHERRILL. No, sir. The only interest this statement would have would be to show the work that has been done in the construction of anti-aircraft emplacements, but that has probably been covered before, so that it would be well to take up the next new project, consisting of thirteen 16-inch rifles and twelve 16-inch howitzers.

Mr. SLEMP. The total cost of that project will be what?

Col. SHERRILL. The total cost of the construction of emplacements for 16-inch guns and 16-inch howitzers for this particular project is \$10,000,000. This morning, in Gen. Coe's hearing, the question came up as to the status of the board of review and why it had not functioned during the war, and so on. He read an extract from General Order 80, War Department, but he did not read, I believe, the preliminary to that, which states that:

The functions then centered in the War Department board of review were transferred to the war plans division, General Staff, and, under date of June 13, 1919, the following rules governing procedure in the preparation and revision of seacoast defense projects were promulgated by The Adjutant General.

Then it goes ahead with a statement as to how those projects were handled. I will read the projects of the War Department which provide for the emplacing of the guns and howitzers I just spoke of. By The Adjutant General's indorsement of July 22, 1919, the War Department authorized the Chief of Ordnance to proceed with the manufacture out of available funds of five 16-inch 50-caliber guns and barbette mounts, and twelve 16-inch 25-caliber howitzers and mounts, in addition to eight 16-inch caliber guns and mounts already authorized, and approved, subject to the development of the study of the revision of the board of review project being made by the war plans division, the following distribution of the seacoast armament under construction or authorized: Boston, Mass., at Calf Island, two 16-inch guns; Long Island Sound, Fort Michie, one 16-inch gun, disappearing carriage. That is the gun for which we are

now building the emplacement and these others are the guns that are in process of manufacture and to emplace which we are asking funds. Fort H. G. Wright, two 16-inch guns and four 16-inch howitzers; Fort Terry, two 16-inch guns and four 16-inch howitzers; New York, Fort Tilden, two 16-inch guns; entrance Chesapeake Bay, Fort Story, four 16-inch guns and four 16-inch howitzers.

Mr. SLEMP. The board of review project was for a great many more guns and howitzers?

Col. SHERRILL. But this is only a part of that. However, all of the guns and howitzers here authorized for emplacement by the War Department are within the board of review project, and only takes care of the guns and howitzers now under construction.

Mr. SLEMP. Do you wish to add to that statement the fact that in every case there has been the approval of the War Plans Division?

Col. SHERRILL. Yes, sir; all of these projects have the approval of the War Plans Division and of the War Department as a whole, under date of July 22, 1919. The status of the work under this existing project is as follows: Under the authority of the War Department of the same date, July 22, 1919, \$100,000 was allotted to the District Engineer at New London for the initiation of work on the emplacement for one 16-inch gun at Fort Michie. The detail plans for this emplacement are now under consideration. The application of available funds to the work at Fort Michie was informally discussed with the appropriations committee in connection with hearings on the fortification bill for 1918. The 16-inch disappearing carriage that is to be provided at Fort Michie is the only one that the War Department contemplates emplacing; all the others are to be barbette carriages, and that is a very special case where the disappearing carriage could be used advantageously.

Mr. OGDEN. Will that lessen the range of the gun?

Col. SHERRILL. Yes, sir; but in that particular case the range was not the controlling consideration: it really is a powerful gun to prevent a run-by, and under this project there will be flanking with less powerful guns and this one right in the gap as a last resort. So the short range of the disappearing carriage will not make it inefficient for the purpose.

Mr. SLEMP. How long will it take you to complete the project?

Col. SHERRILL. We are asking for 25 per cent of the funds necessary to complete that project for next year: on that basis it would probably require four years, possibly three years, to complete the project, but we are asking for 25 per cent, or one-fourth.

Mr. SLEMP. Would you begin work, if this money were given, on all of these emplacements?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. At the same time?

Col. SHERRILL. Yes, sir; because we can do it much more advantageously; not necessarily all, because some of the guns and howitzers are probably not completed, but I mean it would be our policy not to concentrate on one place and try to rush that through, which would be less economical than doing a reasonable amount of work at as many places as were necessary. For instance, we would probably begin at Rockaway Beach and at the eastern entrance to Long Island Sound, Cape Henry, and so on.

Mr. SLEMP. Cape Henry is not included?

Col. SHERRILL. Yes; that is Fort Story; four 16-inch guns and four 16-inch howitzers, practically the board of review project, I believe, for that place.

Mr. BYRNS. Are all of the guns, for which these emplacements are being constructed, now in process of construction?

Col. SHERRILL. Yes, sir; I am sure they are from this statement I read.

Mr. SLEMP. But the time of delivery runs along for three or four years.

Mr. BYRNS. I was going to ask whether they would be completed by the time you have these emplacements constructed?

Col. SHERRILL. Yes, sir. This project is worked out in conjunction with the Ordnance Department so that we will be ready for them as they get the guns; we try to keep a little ahead of them on our emplacements so we will be ready for each gun as it comes due.

TYPE OF EMPLACEMENTS.

Mr. SLEMP. The emplacements you propose are concrete emplacements?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. Of the costliest type we have been building?

Col. SHERRILL. Of the costliest type?

Mr. SLEMP. Yes.

Col. SHERRILL. They are costly, in a certain sense, but, as I indicated a moment ago, the War Department has never yet taken any steps which indicate that they can dispense with these emplacements with their perfected ammunition service.

Mr. SLEMP. Have you made a study of a simple block on which you would place one of these guns and have your ammunition depots dispersed, as a substitute for the proposition you have here in mind?

Col. SHERRILL. That was a study which was made at Fort Barry. In other words, they built a block there and brought up the ammunition from a central depot but it was not a success. I feel, however, that we can still make other studies, with a greater possibility of success, by adopting different arrangements. But the study they made for that purpose was not a success, with the result that the War Department ordered the building of those magazines with the improved ammunition service.

Mr. SLEMP. Did you study the emplacements on the Belgian coast?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. Which were put in within six weeks' time?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. And seemed to serve a useful purpose?

Col. SHERRILL. They did serve a useful purpose. I also saw the big Bertha and all those guns; that is, I saw quite a number of them. But in constructing emplacements for major caliber guns to combat hostile naval vessels there are several principles that have to be observed. The first is that you want to get a maximum rate of fire so that the interval between falling shots will not be too great. The next is you want to have absolute accuracy on your gun platform so that the error of your shots will be the minimum. An-

other is that you want to be able to use the very smallest number of men possible in handling a piece. If you have an inadequate and particularly cumbersome system of supplying ammunition you will have to increase the number of men used to operate that gun and that should not be required at a time when personnel is a fundamental consideration. Therefore the building of gun blocks, with no ammunition service, is one that should only be adopted by Congress, it seems to me, after most thorough investigation by the War Department, and a determination as to whether that can be done advantageously.

Mr. SLEMP. The War Department is not ready finally to pass upon that, is it?

Col. SHERRILL. No, sir. The only test has been made at Fort Barry.

Mr. SLEMP. Therefore, would you advise going on with that particularly costly emplacement until that matter has been thoroughly thrashed out?

Col. SHERRILL. I do advise it; yes, sir.

Mr. EAGAN. In all of these localities at one time?

Col. SHERRILL. At just a limited number, because there are 25 of those guns.

Mr. EAGAN. That makes \$400,000 an emplacement?

Col. SHERRILL. Yes, sir; as an average per gun emplaced. As I say, the present type of emplacement is the one which, up to date, has proved itself most valuable. We contemplate making studies this spring with the view of seeing whether we can eliminate any of this ammunition service by the dispersing method, and when we come back to Congress next year we will have more information to give you.

Mr. SLEMP. If this money were appropriated by Congress what would you deem to be the attitude of Congress on the subject?

Col. SHERRILL. I would not consider that Congress had authorized or committed itself, necessarily, to the proposition of constructing all of these emplacements as at present intended if the War Department finds it can simplify them in any way. That would be my interpretation of that. In other words, if we can, by our studies which we are going to undertake this spring, find that we can eliminate any of these facilities which heretofore have been considered essential we will feel justified in doing that.

Mr. SLEMP. What saving would result if that were done?

Col. SHERRILL. It would make a large saving if we can cut out the bombproof magazines, the bombproof plotting room, the bombproof power plant, and the bombproof switchboard room now connected with these emplacements. If we can have sufficient protection by dispersal and place the ammunition on light railroad tracks in the rear we would undoubtedly be able to save quite a large sum of money.

Mr. SLEMP. About 50 per cent?

Col. SHERRILL. I should say it would easily be that much, although those figures are merely an estimate, because we have not thoroughly investigated.

Mr. OGDEN. What number of emplacements would be put under construction during the next year if this appropriation is made?

Col. SHERRILL. We would be working on all of those emplacements. As I say, we have asked for so small a portion of the entire amount that we can use it advantageously, whether we go into this old type of ammunition service or the new type.

Gen. COE. I should like to say that I would not recommend to Congress the appropriation of one cent of the \$2,500,000 if I considered it was based on the proposition of the complete construction for which those estimates are made.

Mr. SLEMP. In other words, you would not consider, if this \$2,500,000 were given for this purpose, that that meant a commitment to the \$10,000,000 project?

Gen. COE. No; and I do not think anybody wishes that so considered. I am very strongly of the opinion that modifications for better construction, such as suggested by Col. Sherrill, can be accomplished and give satisfactory results; but neither the Engineers nor the Coast Artillery are prepared to state just exactly how far we can go in that direction at this time, although the matter has been under discussion by both branches for some time. I will undertake to say that I feel sure no one will expend any more of that money than is necessary for carrying out this project as a result of our studies.

Mr. EAGAN. And before you could spend all of that money you will have finished your studies?

Gen. COE. We know that certain things are absolutely necessary.

Col. SHERRILL. We can spend a large part of that money on things we know we have to do in any event, without touching the things that are in controversy; we can spend all of this money whether we touch them or not.

Gen. COE. And that is my sincere hope, that a large proportion of the work will be done for that initial appropriation. Col. Sherrill estimates it at 50 per cent, but my impression is that it may go far beyond that.

Mr. SLEMP. At what point could this committee substitute railway mounted artillery to take the place of these 16-inch guns and 16-inch howitzers?

Col. SHERRILL. I do not believe we should substitute railway artillery at any place to take the place of this project, because if you fall below the project of the board of review in the getting of effective armament it is a step to the rear, in my opinion; but there will be great use for 14-inch railway mounts to supplement the board of review project for 16-inch guns and howitzers. To-day the 16-inch gun has power at least double that of the 14-inch gun.

Mr. SLEMP. Not double, but its relation is about 75 to 125.

Col. SHERRILL. In power?

Mr. SLEMP. Yes.

Col. SHERRILL. Well, it is pretty close to double; it has very much larger power. The board of review adopted this project several years ago, and nothing has ever been done in the War Department to indicate that we should recede from that project in any way whatever, but that does not mean we can not make an effective use of the railway guns, which, as Gen. Coe said this morning, is nothing more or less than having guns of somewhat smaller caliber which you can move from one platform to another platform. As I say, I

can not too strongly urge, and the War Department has so expressed itself, that this project should be carried out; that is, not in all its details but to the extent of placing those guns in those positions sufficient to match any hostile navy that may be brought against them.

Mr. SLEMP. Of course, the 14-inch railway mounts, in addition to your board of review project, is equivalent to going beyond what the board of review asked for?

Col. SHERRILL. Yes, sir.

Gen. COE. Hardly that, because the board of review project is by no means complete; this is only some 30 or 40 per cent of the board of review project.

Col. SHERRILL. This does not complete, by any means, the board of review project, and the point is that it is proposed to make use of some 14-inch guns to supplement this project at places where we are going ahead on the board of review project.

Mr. SLEMP. What particular reason calls for the selection of these particular sites for the 16-inch guns and mounts?

Col. SHERRILL. I have here a brief summary of each of the different sites at which it is contemplated to locate these guns.

Mr. SLEMP. Will you give them in the order of their importance?

Col. SHERRILL. We have not them listed strictly in the order of their importance, but in my opinion the order of importance would be Chesapeake Bay, Fort Tilden, Fort H. G. Wright, Fort Terry, and Boston. I am not including Fort Michie which is already under construction.

Mr. SLEMP. How far are Fort Wright and Fort Terry from New York City?

Col. SHERRILL. They are down opposite the eastern entrance to Long Island Sound and in connection with the gun at Fort Michie will give the protection necessary.

Mr. SLEMP. How many miles is it from there to New York City?

Col. SHERRILL. In the neighborhood of 75 or 80 miles.

Mr. SLEMP. Then if the purpose of the 16-inch guns was to prevent the bombardment of the city of New York, the distance ought to prevent that.

Col. SHERRILL. That is not the primary purpose of that armament. That armament is to prevent the entrance of the enemy into Long Island Sound. Then you have the protection of a large number of cities, New Haven, Bridgeport, and the naval establishment at Narragansett Bay. The protection of New York proper from bombardment would be accomplished by those guns at Fort Tilden, which is Rockaway Beach, which is at the southern entrance, and also the guns which have been emplaced at Fort Hancock. The present armament on Long Island Sound that is in the neighborhood of New Haven, Bridgeport, and the other cities in there would be more or less of a second line of defense to this outer line at the eastern entrance to Long Island Sound, and is considered one of the most vital spots in the country from a defensive point of view; that and Cape Henry.

Col. SHERRILL. It is right close to the Sound and this gives a perfect protection and at the same time you protect the eastern entrance to New York.

Mr. SLEMP. It does not seem very logical to say that protection is afforded New York by protecting the entrance to the Sound, 75 miles from New York, absolutely beyond range, and which can be mined.

Col. SHERRILL. That would be one of the cheapest investments we could make, considering the immense interests between that place and New York.

Mr. SLEMP. Of course, the New York, New Haven & Hartford Railroad runs along Long Island Sound for 75 miles and that could be protected by guns with railway mounts.

Col. SHERRILL. It is considered by everyone as absolutely essential to protect that section. It is not really for the protection against bombardment of New York City, except that would have to be done somewhere, and why not do it here where it can be done so much cheaper.

Mr. BYRNS. Colonel, suppose the construction of some of these emplacements were not undertaken during the next fiscal year, would that or not result in the delay of the installation of these 16-inch guns, taking their time of delivery into consideration?

Col. SHERRILL. Yes, sir; I think it would.

Gen. COE. It will even do so now.

Col. SHERRILL. They are already under construction now.

Mr. BYRNS. That is true as to some of them. My question was, Suppose Congress should not make an appropriation to start the construction of all of these emplacements but only a portion of them, so you could not begin construction work on all of them during the next fiscal year, would that result in delaying the installation of the guns.

Col. SHERRILL. Yes, sir; it would, because all the guns will be delivered before we can possibly get these emplacements ready.

Gen. COE. For instance, at the end of 1920 six of the 16-inch guns will be completed and all the 16-inch howitzers. I am speaking of the calendar year. At the end of 1921 nine 16-inch guns and, as I have said, all the howitzers will be completed by the end of 1920.

Mr. BYRNS. So you think, then, it is clearly necessary to make the appropriation for all of them?

Gen. COE. I think the appropriation for starting them should be made, because the guns will be ready.

Mr. SLEMP. It depends on how many men you are going to keep employed at the arsenals as to whether you get those 16-inch guns completed or that many completed by December, 1920?

Gen. COE. I do not know whether there is any Ordnance man here who can answer the question as to what those completion figures are based on.

Col. SHERRILL. As I understand the Ordnance program, this work is under way and these would be the first things completed. The question of the number of men employed, I think, would depend largely on what new projects Congress authorizes them to go ahead on in the way of development. I do not believe they would ever cut down to the point that they would not finish these guns.

Mr. SLEMP. The point was whether they would complete 4, 6, 8, or 12.

Col. GATCHELL. It would depend, later on in the fortification bill, when you come to the ordnance estimates, whether you approve of the money for us to carry on these projects that are carried in our estimates, that will automatically furnish the men to do it. If you do not approve the project, we can not do the work at all.

Mr. SLEMP. As I say, the two work together.

Col. GATCHELL. Yes, sir; but if the project is approved we will have the men to do it and it will be carried out on schedule time—that is, as nearly as it can be estimated.

Gen. COE. But the question you wanted answered, as I took it, was, What was the basis of Ordnance operations at the arsenals which would complete these guns in the time stated?

Mr. SLEMP. Yes; we will get to that later in the production end of it, and your engineering estimate, of course, is based upon their program?

Col. SHERRILL. We are just keeping up with them. My idea was, which Col. Gatchell did not quite answer, that their primary necessities are based on these things, and that their additional estimates which they hope to get, are based on certain development work which would, if you give it, require more employees, but Congress has indicated that they want them to run these arsenals, and these would be included in the minimum of their work, and therefore we can say that this work would go ahead as scheduled, probably, I would say.

Mr. BYRNS. And your present plan is to complete all these emplacements by what time?

Col. SHERRILL. It would take four years to complete them all, and our plan is, as far as possible, to begin work on all of them, but we would not like to say we will begin work on all of them because that would depend on the conditions surrounding each case, which we take up separately.

Mr. SLEMP. Suppose you had a divided program of so many 16-inch guns and so many 16-inch howitzers, with your 14-inch guns, would that simplify the problem somewhat, so that you would put the guns at one place and the howitzers at another, or would the preliminary work for all of them be just the same?

Col. SHERRILL. As I indicated a moment ago, under the present approved project of the War Department, this is the minimum of what we should go ahead with, and we should not rely on the 14-inch guns on railway mounts to replace these. They are good for supplementing these at other points, but they are not to be considered in the light of replacing any of these highest type of armaments at our most important places. You see these are only used at a very few important places. We do not undertake to put them at places where it would be desirable to make a vessel stand off at sea, but to prevent a powerful attack at some place like New York City or Chesapeake Bay where we can not possibly take a chance of having the enemy successful.

Mr. SLEMP. Sandy Hook is not included.

Col. SHERRILL. No; because we have already the 12-inch rifles there and Fort Tilden takes care of that, and even there we do not call for anything like the complete project. There are four howitzers that are not asked for in this and also two more guns, so this is the very minimum that we should go ahead with at this time.

COST OF EMPLACEMENTS.

Mr. SLEMP. What is the estimated cost of each emplacement now at the respective places?

Col. SHERRILL. We have the estimated costs tabulated here on the basis of the present type of complete emplacement, with provision for all the facilities that have heretofore been considered necessary, and a perfected ammunition service. At Boston, Calf Island, for two 16-inch guns, \$1,200,000; that is, for two emplacements, \$600,000 each.

At Long Island Sound, Fort Wright, two 16-inch guns, \$1,150,000; four 16-inch howitzers, \$620,000 for the four.

Fort Terry, two 16-inch guns, \$1,200,000 for the two, or \$600,000 each; four 16-inch howitzers, \$625,000 for the four.

Fort Michie, one 16-inch disappearing gun, \$850,000.

At Fort Tilden, which is at Rockaway Beach, two 16-inch guns, \$1,150,000.

At Chesapeake Bay, Fort Story, which is Cape Henry, four 16-inch guns, \$2,450,000; four 16-inch howitzers, \$755,000 for the four.

These estimates are based on the complete emplacements, and, as we have indicated, our studies we hope will allow us to materially reduce those figures.

Mr. BYRNS. As I understand, Colonel, you have estimated for 25 per cent to begin construction on all these emplacements during the next fiscal year unless you should later on determine that it was inadvisable to do so?

Col. SHERRILL. Yes, sir; that is it.

CHESAPEAKE BAY (FORT STORY) PROJECT.

Mr. SLEMP. Why do you put at Fort Story four 16-inch guns as against two—

Col. SHERRILL. That is considered the most incompletely defended as well as one of the most vitally important areas we have, because that really is the primary naval base for the United States, and the one that the Navy depends on more, probably, than any other.

Mr. EAGAN. That is at the entrance to Chesapeake Bay?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. It is situated better for 14-inch guns on railway mounts than any other spot, is it not?

Col. SHERRILL. This is considered, Mr. Slemp, as the absolute minimum of armament you want to put there and keep there under any and every condition, and the 14-inch armament you would have to put there would run up to a very large number of guns to meet a heavy naval attack.

Mr. SLEMP. What was the board of review project for Fort Story?

Col. SHERRILL. This is the board of review project for Fort Story except the board of review project provided for eight howitzers.

Mr. SLEMP. There has been practically no work done at Fort Story?

Col. SHERRILL. Yes, sir; a great deal of preliminary work.

Mr. SLEMP. You have acquired the site and built a railroad.

Col. SHERRILL. And the mining casemate and a few things like that, but so far as the batteries are concerned no work has been done on the batteries.

Mr. SLEMP. Just some 6-inch batteries or something of that sort?

Col. SHERRILL. Yes, sir; temporary batteries.

Mr. OGDEN. Can any reliance be placed on the railway guns at Chesapeake Bay?

Col. SHERRILL. Yes, sir; I think they are very important as a supplement to the more powerful fixed emplacements, but from my point of view each one of the more important defensive positions in the United States must have a certain minimum armament. For instance, take Cape Henry: Under every and under all conditions we must insist on that being adequately armed with a certain minimum armament, and that is what the board of review has provided for; something you could not take away if you wanted to. It must be there in the most effective position. If a navy should bring a preponderance of naval armament against that, then you would have to supplement it with the guns you might have on the Pacific coast or some other place, and you would bring in your 14-inch railroad mounts; but the War Department has never taken any action to indicate any divergence from that view; that these important naval stations and other important points should not be left without, at all times, adequate armament provided by these more powerful guns and howitzers.

Mr. OGDEN. In placing these 16-inch guns, you are, as a matter of fact, providing a margin of safety there.

Col. SHERRILL. We consider that the minimum armaments that should be placed there and left there at all times of the powerful type, because after all the 14-inch gun is not quite up to date at present. It has a penetrating power, as Gen. Coe indicated this morning, that would be fairly satisfactory against the present battleships; but if you assume the slightest advance in battleship construction, you would not have the penetrating power with your 14-inch guns. For instance, at 11 miles, with your 14-inch guns, you get with an absolutely normal hit only 12 inches of penetration, and a normal hit is exceptional. Now, if you assume anything less than a normal hit, you cut down your penetration right there; whereas if you go up to 18 miles, you only get 10 inches of penetration and therefore your 14-inch gun is just about as small as will be effective against the present-day battleships, and therefore the War Department has consistently held to the view they did not want to withdraw from the 16-inch armament, the 16-inch guns, and the 16-inch howitzers which are, we know, adequate for any naval armament that is contemplated.

Mr. SLEMP. Is there anything else you wish to say on this item?

Col. SHERRILL. We feel, and the War Department as a whole has agreed with the Chief of Engineers in classing, this item of \$2,900,000 as absolutely essential. That is most essential, and it is recommended by everybody concerned. I wish to make that statement. We would like to have \$400,000 for continuing the work at Fort Michie. That is a thing that I wished to have cleared up. The whole department recommends that item. The only one under construction now is at Fort Michie, and we would like to have that con-

sidered when you take up the question if you propose to cut down any of our estimates.

Mr. SLEMP. \$400,000 is to complete the existing project.

Col. SHERRILL. It will not complete it, but it will be just carrying on the work that is under way at Fort Michie.

Mr. SLEMP. That is a part of the \$2,500,000?

Col. SHERRILL. This \$400,000 is for work now under way at Fort Michie. The other \$400,000 is to complete existing work on 12-inch batteries.

Capt. GARLINGTON. If there should be a disposition as a result of this testimony to reduce the 16-inch gun project, we want money for that one gun at Fort Michie. The work has already been begun.

Mr. SLEMP. \$100,000 has already been spent on it?

Capt. GARLINGTON. We have allotted to that nearly \$212,000.

Mr. SLEMP. Your statement awhile ago was \$100,000.

Mr. OGDEN. The total cost of the emplacement is \$850,000?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. You stated a moment ago that \$100,000 had been allotted to it.

Col. SHERRILL. Yes, sir; that was last August, but we have allotted more up to this time. We have allotted something over \$200,000 up to date.

Mr. SLEMP. You propose to do \$400,000 worth of work there next year?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. That is of the most modern type of emplacement, and you have made it without consideration of the simplified block platform that we have been talking about?

Col. SHERRILL. No, sir; it has magazines and everything.

Capt. GARLINGTON. We have studied the proposition, but there is no room in the island for dispersed magazines.

Col. SHERRILL. No matter what is done, the local conditions make that essential as it is. It could hardly be changed.

MODERNIZING OLDER EMPLACEMENTS IN THE UNITED STATES.

Mr. SLEMP. The next item is modernizing older emplacements, and the estimate for the next fiscal year is \$157,510. There was appropriated under this head for the fiscal year 1920 \$37,250. Tell us about the work done under this.

Col. SHERRILL. There is \$137,510 estimated to take up new work with, and \$20,000 to complete work that we now have under way. There was unexpended on December 31, 1919, the total sum of \$50,684.55, and the estimated expenditures by the end of the year will use all of it up.

Mr. SLEMP. You will have no balance at the end of this year?

Col. SHERRILL. No, sir. That item has been used in extending the field of fire of batteries, widening platform, enlarging shot hoists to take care of different types of shells, and things of that sort, where we have to make changes in the general emplacement in order to accommodate it to the new conditions as to armament or otherwise.

Mr. SLEMP. When you get an emplacement completed, outside of its maintenance, what is the idea of spending a lot more money on it?

Col. SHERRILL. For instance, take that question of widening platforms, or the question that Gen. Coe brought up here to-day: There is constant development in the type of projectiles that are used. The projectile that was designed for a certain 12-inch battery at the time it was built is not the type of projectiles that will be used later. Probably it is of a different shape, or the shell will have a longer nose. That means a change in our facilities in order to take care of it. In other words, there is a constant development in the matter of the design of emplacements, just as there is in the matter of guns, ammunition, and battleships. It frequently becomes a question of whether we will modernize the ones we have, or whether the modernizing will be so expensive that it will be better to build something new.

The CHAIRMAN. What emplacements will you wish to modernize? Have you the items there?

DETAIL OF ESTIMATE.

Col. SHERRILL. Yes, sir. For widening platform at Portland, Me., for two 12-inch mortars, \$3,105; Portsmouth, N. H., for two 12-inch rifles and three 10-inch rifles, \$11,610; at southern New York, for twelve 12-inch mortars, \$58,500; at Sandy Hook, for two 12-inch guns, \$9,000; at Key West, two 12-inch guns and four mortars, \$2,900; at Mobile, two 12-inch guns, \$7,600; at Galveston, Tex., two 10-inch guns, \$3,500; at San Diego, four 10-inch guns, \$5,100, making the total for widening platforms, \$101,315.

WIDENING GUN PLATFORMS.

Mr. SLEMP. What do you mean by widening the platforms? These emplacements have been made within the last few years.

Col. SHERRILL. No, sir; these are the old type of emplacements that have been in use for quite a number of years, and this is to take care of new conditions that the artillery has imposed upon them. For instance, there are longer rammer staffs. They use heavier shell and use a longer rammer staff.

Mr. SLEMP. These platforms are built of concrete?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. In other words, your gun is sitting on a platform, and the idea is to extend the platform?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. Have you not been able to get along pretty well without that?

Col. SHERRILL. No, sir.

Mr. SLEMP. Where is the trouble?

Col. SHERRILL. As I have said, the trouble is that the platform as designed was for a different loading arrangement, a different weight of shell, and a different character of shell from the one now used.

Mr. SLEMP. How wide are the present platforms?

Col. SHERRILL. They vary. They are of different sizes, depending on the caliber of the gun.

Mr. SLEMP. Are you doubling the size of the platform?

Col. SHERRILL. No, sir; we would add from 6 to 14 feet in the rear of the platform. It takes quite a large amount of concrete to do that, because it goes all the way around.

Capt. GARLINGTON. Some of those batteries, or many of them, have a second story, or second platform. That upper gun platform is 12 feet above the ground and you must have columns to support it.

Maj. MASTELLER. I can give you some information with reference to one gun platform at San Diego. That battery was mounted in 1897 and the emplacements were finished about 1896 or 1897. In loading the gun the projectile is driven by a rammer and the rammer staff projects over the iron railing of the platform so that the men in loading are not able to use all of the rammer staff.

Mr. SLEMP. When did you discover this condition?

Col. SHERRILL. We have been gradually doing this right along.

Mr. SLEMP. You did not last year.

Col. SHERRILL. We did very little during the war.

Mr. BYRNS. Is this merely a question of convenience or a question of absolute necessity?

Col. SHERRILL. It is a matter of necessity, because it is almost impossible to get those shells in. For instance, take a battleship and it is obsolete in 15 years, and some of these batteries have been built more than 15 years. We must expect a certain amount of changes in order to keep them up to date. This is a small amount, I think, considering the amount of money expended on the emplacements.

Mr. OGDEN. Have you stated these items in the order of their importance or urgency?

Col. SHERRILL. No, sir; they are all comparatively small items as compared with the total involved in the bill. They are very small items. We consider that all of them are essential, but we could arrange them in the order of their urgency, if the committee wishes. We have divided this estimate up into two classes, both of which we consider necessary. Class A we consider essential or most important, and class B items are the less important. Class A, which is considered essential for appropriation this year consists of \$67,500, while class B, which is not considered so important as a matter of urgency, consists of \$33,815. The total of the two classes is \$101,315.

Mr. OGDEN. The expenditure of \$67,500 is confined to what emplacements?

Col. SHERRILL. That is confined to the southern entrance to New York.

Mr. OGDEN. And Sandy Hook?

Col. SHERRILL. Yes, sir; that is included in it.

Capt. GARLINGTON. That is just for widening the platforms. There are some other items under modernizing.

Mr. SLEMP. I wish to ask you about the expenditures last year. You asked \$37,250 last year to remove a hill in order to extend the field of fire at San Francisco?

Col. SHERRILL. Yes, sir; at Fort Barry. That work is underway now, and will probably be finished soon.

Mr. SLEMP. Do you have enough money to complete that project?

Col. SHERRILL. We are not asking any additional money for that.

Capt. GARLINGTON. It has been practically completed. In fact, there was some money left over.

Mr. SLEMP. Is this estimate here based upon the size of the new shell? The guns are not any larger than before.

Col. SHERRILL. No, sir; it is because of the shape of the shell, and also the weight. The shells have have been changed, and are longer and heavier.

Col. CALLAN. I do not think that brings out the whole case, and I think there is one point that ought to be brought out, and that is that when these emplacements were built they were built in accordance with the best ideas they had then. The engineers knew that they would make changes in them as time went on. Many things have been developed since the older type of emplacements were put in, and one of the important things that has developed is to give the artillery-manning party on this gun more room back there to get hold of the rammer staff.

Col. SHERRILL. That was made necessary because of the heavier shell.

Col. CALLAN. That has made it necessary to build wider platforms.

Mr. SLEMP. Is this proposition simply a refinement, rather than a necessity? You would like to have it, but you could load the guns as they are now emplaced, could you not? It seems to me that the addition of a half a foot to the length of the shell ought not to require 6 feet additional width to the platform all around, which would represent a diameter of 12 feet. I do not quite get your argument.

Col. SHERRILL. That is a question for the artilleryman to answer. The Artillery put that up to us, and we have tabulated it as essential. It is desirable, but not absolutely essential, because they could fire the guns without it. We believe it is very desirable to have it done, but it is not absolutely essential. As I say, you could fire the guns without it.

Mr. SLEMP. Why would you need 6 feet of additional platform for 1 foot of increase in the length of shell?

Col. CALLAN. We do not need it for that purpose. The rammer staff extends a couple of feet over the rear rails of the platform with the old length of projectile, and now it will extend 3 feet. At that particular battery at that time, as I recollect, two men of the rammer detail had to wait, after the rammer was in motion, before they could take their places with the rammer to push the old projectile in place, and now, with a longer and heavier projectile, the wait for them will be even a greater one, and 1 foot would not begin to give them the space they require for that work.

Mr. OGDEN. What is the amount involved in this instance?

Col. SHERRILL. The total for widening platforms is \$101,315, which we have listed in two parts, the essential parts, \$67,500, and the less essential or desirable parts, \$33,815.

Mr. SLEMP. The other \$50,000 in your estimate goes for what purpose?

INSTALLATION OF GRATED DOORS AT BATTERIES.

Col. SHERRILL. It goes for several items. One is grated doors for application to projects shown in detail on page 9 of this book, which contemplates the placing of grated doors at a considerable number of batteries in order to give good ventilation. In other words, we can leave the doors open so that the air can circulate through and give ventilation.

Mr. OGDEN. They are to take the place of solid doors?

Col. SHERRILL. Yes, sir. That is a project we have been engaged on for some time.

Mr. SLEMP. And in addition to remove dampness?

Col. SHERRILL. Yes, sir. These grated doors are really essential to the successful operation of the batteries, and we have just been doing from year to year a small amount of work in order to gradually get them fixed up. We are asking \$26,595 for this year.

Mr. SLEMP. You did not ask anything for this purpose last year?

Col. SHERRILL. As you know, the Engineers' estimates were cut down to the very minimum.

Mr. SLEMP. And you asked for that purpose this fiscal year?

Col. SHERRILL. \$37,250 was asked.

Mr. SLEMP. And that went toward the removal of the hill at San Francisco?

Col. SHERRILL. That is true; and that was appropriated.

Mr. SLEMP. Have you a list of the places at which you have to place these grated doors?

Col. SHERRILL. Yes, sir.

Capt. GARLINGTON. Portland, Me.; Portsmouth; Boston; New Bedford; Narragansett Bay; Long Island Sound; New York; eastern New York; Sandy Hook; Delaware River; Potomac River; Charleston, S. C.; Key West, Fla.; Pensacola, and Puget Sound. The total for those places amounts to \$63,200, of which we are only asking at this time \$26,595.

Mr. SLEMP. Will that complete the installation of grated doors at all of the batteries?

Capt. GARLINGTON. Yes; that larger figure, \$63,200 is estimated to do that, but we are only asking for about half that.

WIDENING AMMUNITION HOISTS.

Col. SHERRILL. The next item is the completion of work in widening 10-inch hoists, \$20,000. Under appropriations prior to 1917 all 12-inch Taylor-Raymond projectile hoists in the United States and insular possessions have been altered to accommodate the long-pointed projectiles, and all existing 12-inch Hodges hoists have been replaced by modern 12-inch Taylor-Raymond projectile hoists. All 10-inch hoists on the Pacific coast and in the insular possessions, also all in the defenses of Chesapeake Bay and Long Island Sound have been altered. With funds appropriated February 14, 1917, work was commenced on the remodeling of all remaining 10-inch Taylor-Raymond projectile hoists and on the replacement by 10-inch Taylor-Raymond projectile hoists of all existing 10-inch Hodges hoists. This work was interrupted by the removal of armament from certain 10-inch batteries for shipment abroad, but is now progressing at such batteries as are to remain in service. An estimate of \$20,000 to provide for the completion of the work has been included in estimates submitted for the fiscal year 1921.

Mr. SLEMP. Are you spending anything on that now?

Col. SHERRILL. Yes, sir; we have some of those under construction now.

Mr. SLEMP. From an overlapping appropriation?

Col. SHERRILL. Yes; we have been doing that right up to now, and this is the item estimated to complete that work.

Mr. SLEMP. How much have you spent during the present fiscal year?

Col. SHERRILL. I only have here the unexpended balance and the unallotted balance; I have not a statement showing the amount that was expended during the year.

Mr. SLEMP. You do not know what the entire project cost, do you?

Col. SHERRILL. Those funds we have been using are some of the older appropriations and that is the reason it did not appear in the last hearings, that is, the fact that none were used last year. I will insert that information in the record.

Mr. SLEMP. You will insert in the record the total cost of this project and the amount expended during the year?

Col. SHERRILL. Yes, sir.

Modernizing expenditures, by fiscal years.

Classification.	1917	1918	1919	1920 (To Feb. 29.)	Total.
Widening hoists.....	\$26,734.79	\$135,085.60	\$15,966.39	\$15,506.57	\$193,293.35
Platform lighting.....		1,831.42	1,598.97		3,430.39
Miscellaneous.....	3,283.96	9,719.42	39,244.28		52,247.66
Total.....	30,018.75	146,636.44	56,809.64	15,506.57	248,971.40

Mr. SLEMP. You estimate \$20,000 for this year?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. On what theory do you justify any further expenditure on 10-inch guns under the circumstances of their daily growing obsolescence?

Col. SHERRILL. The theory is that most of these 10-inch guns are in positions where they oppose raids by relatively weak naval vessels, and where they would be perfectly effective in preventing a run by and carrying out such a raid on interior lines as, for instance, at the entrance to Newport, and so on. There is a considerable field of usefulness for these obsolete guns—obsolete as opposed to the modern battleship, but not as opposed to the light raiding vessel carrying minor armament.

Mr. SLEMP. You would regard this, then, as a vital matter?

Col. SHERRILL. Yes. You take Savannah, or some such place as that; the people of that locality would consider it of vital importance to be in a position to prevent a run by for the purpose of making raids and destroying their property.

Mr. SLEMP. At Fort Tybee?

Col. SHERRILL. Yes; at some place of secondary importance, so far as strategical conditions go, but of great importance to the locality in preventing the destruction of their property. Nor are they obsolete for intermediate caliber work—that is, close in against the personnel or upper works of the ships. They are supporting armament, in other words, of the larger armament.

Capt. RUHLEN. Unless the shot hoists are modified it is not possible to serve the long-point projectiles to the guns.

Col. SHERRILL. That brings up another point; that by widening the platforms it would be possible to get all the guns operating; and

it is almost impossible to use a gun unless you have the proper shot hoist. That is why it is material and absolutely essential to get those completed and get that project closed up.

Capt. RUHLEN. The projectiles have to go from the magazines up through the concrete emplacement to the gun platform, and the opening through which the shot hoist passes is just long enough to accommodate the old style projectile, the new projectile being slightly longer, it is necessary to cut out the concrete to get it through.

BATTERY BERRY, PORTLAND, ME.

Col. SHERRILL. The next item is extending the field of fire. Battery Berry, Portland, Me. That is one that is desirable but not absolutely essential. It is simply to enable you to fire around a greater arc; that is all, and while artillery would like to have that we have marked it as not absolutely essential.

Mr. BYRNS. What is the amount of the estimate?

BATTERY CASE, FORT M'KINLEY.

Col. SHERRILL. \$1,600. The next item is new floor, pit A. Battery Case, Fort McKinley, \$1,500. That is also classed as desirable but not absolutely essential.

Mr. SLEMP. How much is asked?

BATTERY KENZIE, NO. 1, FORT WORDEN.

Col. SHERRILL. \$1,500. The next item is extending field of fire, Battery Kenzie, No. 1, Fort Worden, \$5,000. That is listed as essential.

Mr. SLEMP. Where is that?

Col. SHERRILL. It is in Puget Sound.

Capt. GARLINGTON. That is one that was left, being on the Pacific coast, and considered as of extreme importance in that locality.

Mr. SLEMP. Does the field of fire include the mouth of Puget Sound?

Capt. RUHLEN. This estimate is to allow the gun to fire further to the left; to shoot out the Straits of Juan de Fuca.

Mr. OGDEN. What is the character of the work to be done to increase the field of fire?

Col. SHERRILL. It is the cutting away of the obstruction in front of the gun, a part of the hill and a part of the concrete. It only has a certain field of fire and now that they are getting longer ranges they want to get it around to cover a part of the channel that it was not formerly necessary to cover. The conditions actually existing, though, require that this obstruction be removed in order to cover that channel, and in making alterations for extending the field of fire you very frequently have to make corrections in your emplacement so as to get your rammer staff in properly and swing it around. It is essential work to give it the maximum of usefulness. The next item is contingencies. We have put in a small amount for contingencies to cover unexpected items and it amounts to \$1,200.

PRESERVATION AND REPAIR OF FORTIFICATIONS IN THE UNITED STATES.

Mr. SLEMP. The next item in the bill is:

For protection, preservation, and repair of fortifications for which there may be no special appropriation available, and of structures for the torpedo defense of the United States and for maintaining channels for access to torpedo wharves.

Col. SHERRILL. That is an estimate that has been growing somewhat larger as the emplacements and the fortifications approach completion. Of course, they have to be maintained and these items are for their maintenance. I wish to call attention especially to the small amount of that maintenance work as compared with the total amount invested in these fortifications. We take care of all such matters as sodding the slopes, made necessary by freshets and wash-outs, and making current repairs. The percentage is extremely small and is very small compared with the amount of money we have invested in our fortifications. There is an item under that head of \$250,000 for nonstructural preservation and repair. This nonstructural work is done, under the direction of the department commanders, by the district engineer officers, and is to carry on routine and minor work on calls from the commanders of the coast defenses, and we never have enough.

Mr. SLEMP. It is under that appropriation that you got the money for installing grated doors heretofore?

Col. SHERRILL. No; that is modernizing and is a fundamental change in the battery.

Mr. SLEMP. In last year's hearings you stated that you asked for money for grated doors under this appropriation?

Col. SHERRILL. But we decided this year it would be more appropriate under the head of modernizing because it is a change in the battery.

Mr. SLEMP. What I am trying to get at is this: Will you cut out of the \$400,000 asked under this item any part of the amount you have asked for modernizing older emplacements?

Col. SHERRILL. No, sir. This \$250,000 is for minor repairs that do not involve any changes of the structure and those repairs are made under the department commanders for the purpose of keeping the fortification in condition. The next is for application to such items as structural preservation and repair as can be accomplished during the fiscal year 1921, \$150,000, and we have listed here a large number of items that have been sent in and have been approved. Out of those items we have picked the most essential ones, amounting to \$150,000, which is the amount we are asking for.

Mr. SLEMP. What was the total?

Col. SHERRILL. The total asked for by local authorities was \$356,311.20.

Mr. SLEMP. For structural repairs?

Col. SHERRILL. Yes, sir; and we have asked for only \$150,000. So we have kept that down to what we consider the absolutely essential work to be done.

Mr. SLEMP. It does not look exactly logical that you should ask \$350,000 for that particular feature inasmuch as the Appropriations Committee has been giving the Engineer Department all the money it asked for many years past.

Col. SHERRILL. The Engineer Department has always made it a rule to cut this down as we have done because, as I say, the local authorities have asked—not only asked, but have urged—structural preservation and repair items to the amount of \$350,000, and we have cut the amount down to \$150,000. That has been the case all along, that we keep the amounts down to the very minimum that can be agreed upon between the Chief of Engineers and the Chief of Coast Artillery.

Mr. SLEMP. Let us have the itemized statement.

Col. SHERRILL. There is a very large number of items covering six pages, but if you wish, I will give you the items in detail or I will give just an indication of some of the items, and give you a discussion of the entire subject. The appropriation for the preservation and repair of fortifications is charged with the general maintenance and care of all defensive structures at the coast defenses of the United States, with the exception of searchlights and electric light and power equipment. The appropriations under this head for the fiscal years 1903 to 1906, inclusive, and 1911 to 1913, inclusive, were in the sum of \$300,000. During these years, an additional appropriation was made for the maintenance of torpedo structures. That explains that increase, because, as you see, they have now put torpedo structures under this heading. Beginning with the fiscal year 1916, the appropriation for maintenance of torpedo structures was combined with the appropriation for preservation and repair of fortifications, and the sum of \$200,000 appropriated for that year.

The appropriations for the fiscal years 1917 to 1920, inclusive, have been in the sum of \$250,000, although an estimate of \$300,000 was made for each of these fiscal years. Under present conditions of cost of labor and materials, the amount of repair work which can be done for a given amount of money is only about half what could be accomplished 10 years or more ago. The failure to secure the appropriation of sufficient funds under this head during recent years has made it necessary to postpone the accomplishment of specific items of preservation and repair work, with the result that the structures involved will finally deteriorate to such an extent that the ultimate expenditure will be much greater than would have been the case had it been possible to accomplish the work in the first instance. During the fiscal year 1918, the complete coast defenses of Los Angeles, including four 14-inch emplacements and emplacements for eight 12-inch mortars have been turned over to the troops, and the defensive accessories, such as fire control structures, are now in process of construction and will require maintenance during the fiscal year 1921. In addition two mortar batteries at the defenses of San Diego have been completed and turned over to the troops, and it is anticipated that at least 20 of the 24 emplacements for 12-inch long-range guns now under construction will have been completed and will require maintenance during the fiscal year 1921.

OBJECT OF EXPENDITURES.

Some of the items that have been listed, but all of which have not been covered in this, are as follows: Kennebec River, repairing earth cover, \$500; Portland, Me.—I am skipping over the items and just

giving you illustrations—waterproofing walls, fire control stations, \$250; repairing power house, Fort McKinley, \$400; heating power house, Forts Williams and Lyon, \$300.

Mr. SLEMP. What is your largest item? Give us some of the largest items.

Col. SHERRILL. Here is one of the largest, Battery Bartlett, Fort Warren, Boston, new superior slope and resurfacing vertical walls around loading platform, \$33,000. That is about the largest item. Another large item is, Battery Winthrop, Fort Heath, new superior slope and resurfacing walls above leading platform, \$23,000.

Mr. SLEMP. What do you mean by resurfacing walls? The walls are made of what?

Col. SHERRILL. The walls are made of concrete, and in those batteries where they have a great deal of dampness and percolation of water it frequently becomes necessary to resurface the walls.

Mr. BYRNS. In view of the condition of the Treasury you would not regard a matter of that kind as absolutely necessary in this fiscal year?

Col. SHERRILL. No; and I do not think I have included it in this. You see, we have cut that down until it is hardly more than one-third of the original items, but this is a list of the items they have asked for and submitted to us.

Mr. SLEMP. Exactly how much money have you on hand now that you can turn back to the Treasury at the end of this fiscal year?

Col. SHERRILL. We had available and unexpended on December 31 \$122,502.74, and it is estimated that all of that will be expended; in fact, we have had many calls during the last three months for additional funds from the department commanders and district engineer officers, but we have not been able by any means to meet the demands.

Mr. SLEMP. This has to do with the guns and the paraphernalia connected with the forts?

Col. SHERRILL. Yes, sir; the guns, the fire control, power plant, telephone installations in the batteries, light and wiring of the batteries, and so on; just the defensive works only.

Mr. SLEMP. Do you make a personal investigation of these requests that come in for consideration, or how do you handle the matter?

Col. SHERRILL. The way that it is handled is this: Usually for items of preservation and repair, either structural or otherwise, requests are made by the coast defense commander on the district engineer, who investigates the requests and looks over the situation; they have conferences and then a recommendation is made to the Chief of Engineers; the Chief of Engineers then sends it over to the office of the Chief of Coast Artillery, and it frequently happens they will make further investigations; if the Chief of Coast Artillery says he does not consider certain things as essential, we then leave it out; but if he says it is desirable and that estimates should be submitted for it, then the Chief of Engineers puts in his estimates. Those estimates, when they leave the district engineers, come through our division engineer, who has immediate control over the fortifications in the various districts under him, and he from time to time makes inspections and passes on those things accordingly.

So there is never any lack of detailed consideration before these things get approval.

Mr. SLEMP. You seem to have kept your nonstructural amounts rather uniform; that is, you got \$250,000 for 1917 and \$250,000 each year thereafter.

Col. SHERRILL. The reason for that is that that is to cover more than anything else resodding and repairing slopes washed down by water, and doing small jobs of repairing.

Mr. SLEMP. You do not have to resod every year?

Col. SHERRILL. Not at any one particular place, but for instance in Panama, that is quite a big item where they have those heavy storms, and you see in front of these batteries they must have sand fill because ordinary earth is not effective as a bullet or shell stop, and therefore it makes it very difficult to keep those slopes sodded on account of that sand being easily washed out.

Mr. SLEMP. I know that is true down in Panama, but that would not be true up in this country.

Col. SHERRILL. Sand fill at any place is easily washed away and the fill is of sand because it has two or three times the stopping power that earth has, such as you would use for your ordinary slopes, if you did not have the defensive condition in mind.

MAINTENANCE OF CHANNELS.

Mr. SLEMP. Do you use any of this money to maintain channels?

Col. SHERRILL. Yes, we do; to maintain channels for mining purposes; anything that is necessary for the coast defenses that is all it is used for. It is for maintaining structures.

Mr. SLEMP. That is included in the item, but you do not really spend any money for that purpose?

Col. SHERRILL. Yes, sir; we had such an item not more than two or three months ago up in New England calling for the maintenance of a channel in connection with a mine-defense proposition.

Mr. SLEMP. Did you do any of that work last year?

Col. SHERRILL. We have not the figures right here, but I dare say we did do some. As I say, I remember one item of this kind not long ago, but I do not believe that item has been completed.

STRUCTURES FOR TORPEDO DEFENSES.

Mr. SLEMP. This item includes structures for the torpedo defense of the United States; do you maintain any such structures?

Col. SHERRILL. For instance, here is one right here, repair to wharves at Fort McKinley, which is in connection with the submarine-mine wharves. Here is an item for an additional torpedo track for the torpedo storehouse at Fort McKinley. That is for the submarine-mine project, too. There is a very great variety of structures we have to take care of with these limited funds.

Mr. SLEMP. You are going to submit an itemized statement of the structural changes you will need money for.

Col. SHERRILL. Yes.

Mr. SLEMP. That is, the \$150,000 of the \$400,000, and, as I understand, the \$250,000 is for routine work.

Col. SHERRILL. That is routine.

Mr. SLEMP. You only asked this year for \$200,000 for this purpose.

Col. SHERRILL. Since the beginning of the war the prices have doubled, as you know, and each year we have gotten considerably less than we have asked for, and therefore that has left a great deal of work to be done.

Mr. SLEMP. What portion of the \$250,000 that you had for this current fiscal year was applied to structural improvements and what portion to nonstructural improvements?

Col. SHERRILL. I will insert that in the record.

Preservation and repair—Expenditures by fiscal years.

Classification.	1917	1918	1919	1920 to Feb. 29.	Total.
Structural.....	\$41,393.19	\$92,780.60	\$3,386.76	\$119,520.11	\$257,080.66
Nonstructural.....	356,106.40	119,147.09	222,874.48	168,957.48	867,085.45
Total.....	397,499.59	211,927.69	226,261.24	288,477.59	1,124,166.11

HISTORICAL FORTIFICATIONS.

Col. SHERRILL. In addition to the defenses that are actually being used, there are also some historical fortifications. The work has been completed on the historical fortifications and no estimate is being asked for this year.

Mr. SLEMP. Would that be under this item?

Col. SHERRILL. Yes, sir; we have gotten money under this item for years past for that work but none this year.

Mr. SLEMP. You do not mean by "completed" that all the old, historical sites or fortifications are already taken care of.

Col. SHERRILL. No; but I say there is none estimated for this year. We have a list of all the estimates, but we felt that we would have to keep our estimates down to such a low limit that we could not do it this year. For instance, the estimates that have come in amount to \$106,473 for repairs including maintenance, and there is a balance to be provided of \$87,300.

Mr. SLEMP. That is, for the historical fortifications?

Col. SHERRILL. Yes, sir; and we have not gone into those at all because we felt we could not do that at this time.

Mr. OGDEN. I would like to get the Colonel to call off, say, a half dozen of the principal items entering into the structural preservations.

Col. SHERRILL. Here are some repairs to searchlight shelters at Portland, Me., \$1,200; new door and railway to mine storehouse, Fort Williams—you see that is something that is essential but it is a little change in the existing work and we have put that under the head of preservation and repair; but a part of it is a structural change.

Mr. OGDEN. Do any of the items amount to as much as \$5,000?

Col. SHERRILL. Some few items do, yes; but they are usually limited from \$200 to \$1,000. This particular one I read amounts to \$1,525.

Mr. OGDEN. There was an item of \$33,000 discussed a moment ago.

Col. SHERRILL. This includes all the requests that have come in and that have been urged, but we have not accepted all of them.

Mr. OGDEN. I understod from your statement that you were not certain whether the item of \$33,000 was included in your estimate or not.

Col. SHERRILL. We have not separated the items. We have only asked for about one-third of the amount that has been demanded, and when the time comes we will apply it only to the places that are absolutely the most urgent. We have not made an effort to see which ones we will cover, but in all probability that large item we would hardly undertake because we could not afford to do it. It would take up too much of our fund.

PREPARATION OF PLANS FOR FORTIFICATIONS.

Mr. SLEMP. The next item is, "For preparation of plans for fortifications and other works of defense, \$25,000."

Col. SHERRILL. \$25,000 has been regularly estimated and has been allowed for the last few years, and this item is divided into two parts, one of the expenses of the Board of Engineers, and the other is the general preparation of plans for defense for which no funds are definitely or specifically set aside by Congress. In other words, if a question comes up for consideration of certain defense plans down at some small place on the coast and we have no definite appropriation for that, then this would be used. It is just for preliminary work.

Mr. SLEMP. Colonel, it is a small matter, but ought not this be taken over by the War Plans Division of the General Staff?

Col. SHERRILL. No, sir.

Mr. SLEMP. And ought they not to be working on these plans themselves all the time?

Col. SHERRILL. They are working on them, but the work of our bureau is all the detailed engineering work on these plans. The work the General Staff do is in the nature of the general project.

Mr. SLEMP. It is all office work, is it not?

Col. SHERRILL. No, sir; it is not all office work by any means. Frequently we are asked to investigate locations.

Mr. SLEMP. It is the preparation of plans?

Col. SHERRILL. It involves surveys and all sorts of things. The work the General Staff do is simply drawing up the general features of the project, which does not involve any of the detail surveys or anything like that, but if the General Staff do desire or if it is desired by the War Department to make a certain study, they call on the Engineers to do that work and we submit certain data on which they can base their conclusions.

That is the way it is done. In other words, if they are given a job we would do the actual detail work in order to fit in with their plans. We have the field officers. They have no field officers to do this work nor should they have. That is not a function of the General Staff and should not be, because they are the body that makes the general plans in accordance with which the different bureaus work; in other words, they are not an operating service.

Mr. SLEMP. You say half of the money goes to the Board of Engineers?

Col. SHERRILL. Yes; and they develop types of emplacements. In other words, if the Chief of Engineers decides, in conjunction with the Chief of Coast Artillery, that a certain type of emplacement is desirable, or a certain new development, we get up the general features of that and send it to them and they work it up in detail, because being a field force they can do it better and it decentralizes the work better than if we did it here.

Mr. SLEMP. Suppose this appropriation were eliminated, how much would it handicap you?

Col. SHERRILL. It would handicap our work very much, indeed. Suppose, for instance, you had not appropriated any money for 16-inch emplacements, we would have no money to make preliminary studies and could not turn a wheel until the money was appropriated, and yet we are forbidden to ask for an appropriation under the law until we get the plans.

Mr. BYRNS. It would save you a year in time?

Col. SHERRILL. Yes, sir.

Mr. BYRNS. Do you spend practically all of this sum every year?

Col. SHERRILL. Yes, sir; we spend every bit of it.

Mr. SLEMP. And you look upon this as a useful appropriation?

Col. SHERRILL. It is absolutely vital because it enables us to get up data or records we want and that Congress wants all the time in advance to the appropriation.

TUESDAY, MARCH, 23, 1920.

RAILWAY ARTILLERY.

Mr. SLEMP. Under this item for preparation of plans for fortifications and other works of defense, do you contemplate preparing plans for the use of railway mounted artillery and tractor-drawn artillery for the defense of the harbors and the coast line of the United States wherever possible?

Col. SHERRILL. We have that under consideration, and one of the elements of that is the determination of exactly where the railroad artillery of all the different calibers can be brought close enough to the channels and waterways along the coast to be effectively used. The funds for plans are used more for detailed drawings and small surveys such as the orientation of stations and things of that kind; in other words, it is the drafting work largely. There is no planning in the large phases of this matter. That is handled by the War Plans Division.

Mr. SLEMP. Has that been done to any extent in the United States or is it just being considered as the next line of development?

Col. SHERRILL. We are investigating under War Department orders all the railroads in the United States to find out what railroad artillery they can carry. For instance [referring to map], we have determined now that there are only two transcontinental routes—you will notice these heavy lines—that will carry all the different artillery carriages that are now used. The ones you see in very heavy lines

there will carry all except the heaviest and certain others will carry only the very small calibers like 6 and 8 inches. It has been determined that you can only send railroad artillery to the Pacific coast on two routes, one goes this way to San Francisco, but if you want to take those back you have to take them out following these lines [indicating] to get to Portland, and between Portland and San Francisco the heavier guns can not go at all. This chart, which we have worked up in conjunction with the Chief of Coast Artillery's office and the Railroad Administration indicates the various main stations along the coast where you can get this railroad artillery to, but it does not give in detail to what extent the railroad artillery in position along there will be usable against a naval vessel on the water. That investigation we are having made by our local districts which is really outside of the railroad function.

Mr. SLEMP. And out of what appropriation?

Col. SHERRILL. Out of this little appropriation for plans.

Mr. SLEMP. Is not this \$25,000 a very modest sum?

Col. SHERRILL. Yes, sir; it is. They have the data in the office, and it is only a matter of compilation. They have to sometimes investigate to find out how close they can go—

Mr. SLEMP (interposing). That is, in order to make a study of the topography?

Col. SHERRILL. Yes; but it is usually a matter of compilation. On this chart you will see that there are relatively a small number of places along the coast—in fact, all the way down here to the Mexican border there are relatively a small number of places where all of the heavy guns can reach the coast. For instance, they can go to New Orleans; they can go to Galveston, but they can not reach the coast anywhere in here or in this area [indicating]. When we say that the guns, for instance, can go to Charleston we will have that district officer indicate to what extent the tracks on that route are located sufficiently near to the channels to cover those channels, which is not given in the general data.

Mr. FRENCH. Is it not true that the places along the coast where the heavy guns can not reach the heavier draft vessels also could not reach the coast?

Col. SHERRILL. Not necessarily; no.

Mr. SLEMP. They are not large centers of population usually?

Col. SHERRILL. No; but frequently in going to a city you can reach the city without building considerable railroads out to the point where you want those guns to go to protect that city. At Montauk Point you get a perfect position for aiding in the protection of New York, because you can run any kind of guns out to the end of Long Island, but there are other places where that can not be done, and those are the things we are investigating now.

Gen. COE. The important thing about that map is that all calibers can go to the important points of the coast line which are between Chesapeake Bay and Maine. The 12-inch mortar, which is a powerful seacoast weapon, can go anywhere on any railroad—that is, any of the main lines—in the country. That is a minor weapon so far as the railroad weight is concerned.

Mr. FRENCH. What is the reason the heavier guns can not go to these other places? Is it because the track is too light?

Col. SHERRILL. Yes; because of the deficiency in the track and bridges, and so on.

Gen. COE. And especially the clearances.

Col. SHERRILL. Yes; but as I have said, the detailed investigation which we are making now involves the question of using artillery in some particular position, as, for instance in the vicinity of New Orleans. The investigation we are now making is to determine to what extent the artillery can go down on each side of the river where we show there is a railroad track, and be used down there. That has been determined already to a certain extent, but those investigations we are making now.

Mr. SLEMP. How long do you expect to be occupied with investigations of that character?

Col. SHERRILL. They will be practically ended in a short time but it is something that we have to keep up to date, and as I say, so far we have spent very little money for it.

Mr. SLEMP. And it is mostly a question of the selection of strategic points from which you could effectively use a gun along these railroad tracks.

Col. SHERRILL. Yes, sir; we will furnish that data and do furnish it to the Chief of Coast Artillery and he furnishes it to his officers. We also furnish copies to the Department Engineer who uses it in turn with the Department Staff and the Department Commanders in working out their probable defense in these different departmental areas.

Mr. SLEMP. I suppose that will be a work of years.

Col. SHERRILL. This is just the very first step in this railroad artillery study.

Col. CALLAN. We know that the 14-inch guns can go over these full lines, and that does not mean they can not go over these others, but they do not know yet whether they can or not.

Mr. SLEMP. Having gotten these heavily shaded lines and knowing that they represent routes over which you can transport these guns, what have you done in taking the next step of fixing the points along those lines at which you would locate a gun in case of an attack?

Gen. COE. That is a matter that is being studied by the Department Commanders and District Engineers.

Col. SHERRILL. That will be studied for a course of years. We do not handle that question in the War Department in detail except to get the information.

Mr. SLEMP. The same principle will apply to the highways?

BOARD OF REVIEW PROJECT.

The CHAIRMAN. Colonel, the Board of Review project embraced emplacements at an estimated cost in continental United States of \$13,863,000. Since the adoption of that report you have changed your plan somewhat by injecting into the problem the use of railway mounts, which will necessarily necessitate the abandonment of a great many of those emplacements.

Col. SHERRILL. No, sir; that policy has not been decided by the War Department.

The CHAIRMAN. Well, take for instance, Cape Henry; you have abandoned the permanent emplacements there?

Col. SHERRILL. No, sir.

The CHAIRMAN. You had a year ago.

Col. SHERRILL. There has been no action to abandon those 16-inch gun and howitzer emplacements. I can show you that in this decision of the War Department.

The CHAIRMAN. How about the emplacements for guns of smaller caliber?

Col. SHERRILL. There are no emplacements for guns of smaller caliber than 16 inch.

The CHAIRMAN. When the representative of your department was before the committee last year it was stated that you were not going to do anything with regard to putting any emplacements at Cape Henry because it was the intention then to place all guns mounted at Cape Henry, possibly with the exception of the 16-inch guns, on railway mounts, and that a study was being made of that at that time.

Col. SHERRILL. I do not recall the hearing, Mr. Good; but this is my impression of what the status at that time was: That when they came before the committee last year—that was before I came to Washington from France—at that time it was desired not to embark on this Board of Review project, any of it, until they had made some study based on the results of the war, and I think the statements made before the committee then were to the effect that they did not want money that year for any of those big projects because they wanted to wait until they had made that study. Now, as a result of that preliminary study, on July 22 of last year the War Department stated its policy.

The CHAIRMAN. Then, Colonel, if I understand you, in a broad way the policy now of the War Department is to go ahead with all the fixed emplacements provided for in the board of review project with regard to the guns of larger caliber, and to supplement that with a very extensive system of railway mounts?

Col. SHERRILL. No, sir; that is a little incorrect.

The CHAIRMAN. In what respect is it incorrect?

Col. SHERRILL. It is incorrect in this respect, that the War Department has not decided to go ahead with the complete number of either the 16-inch guns or the 16-inch howitzers called for by the board of review project. It has decided to go ahead with the thirteen 16-inch rifles and twelve 16-inch howitzers, supplemented by a certain number of mobile guns, but that is very, very much less than the project of the board of review which called for twenty-two 16-inch rifles, forty-eight 16-inch howitzers, and twenty-four 12-inch long-range guns, which are already in, and some smaller guns. In other words, that is very much larger than the project they are now going ahead with. They are taking account of the railway guns, as this policy which I can read if you wish, will indicate.

The CHAIRMAN. Well, take the 16-inch rifle you plan now to mount; how many of the 22?

Col. SHERRILL. Thirteen out of the total number.

The CHAIRMAN. And how many guns of that caliber do you plan to place on railway mounts?

Col. SHERRILL. None at all of the 16-inch; that is, the carriage development has not advanced sufficiently to use anything heavier than 14-inch guns on railway mounts, and the only reason or the principal reason why they are using those 14-inch railway mounts is because they have the guns and they can effectively use those and use material they have at less cost than they could convert the same amount of power into 16-inch guns, which is a better gun.

MAINTENANCE AND REPAIR OF SEARCHLIGHTS, ELECTRIC LIGHT AND POWER EQUIPMENT IN THE UNITED STATES.

Mr. SLEMP. The next item is:

For maintenance and repair of searchlights, and electric light, and power equipment for seacoast fortifications and for tools, electrical and other supplies, and appliances to be used in their operation, including the purchase of reserve lights, \$75,000.

Now, you had last year \$50,000 for this purpose. What is the state of your balances?

Col. SHERRILL. On December 31 the total balance on hand was \$98,000. It was estimated that all of this sum would be expended before the end of the fiscal year.

Mr. SLEMP. Colonel, how would you manage to spend so much money on this item when the appropriation for this purpose for the last 19 years has averaged about \$40,000?

Col. SHERRILL. During the war, Mr. Slemp, the use of these searchlights was increased very largely on account of war conditions, for instance, at the Panama Canal.

Mr. SLEMP. But this does not refer to the Panama Canal.

Col. SHERRILL. I mention that just as an instance because I was familiar with that case; but it was necessary at the important defensive positions to operate these lights constantly as a safeguard and protection against enemy operations, and they, therefore, used up very, very much more of their supplies and materials than they ever did before. Moreover, in the past year or two, particularly in this past year, the numbers of searchlights that have gone into the coast defenses have been very largely increased. Both to take care of that shortage caused by the war and the increased number of searchlights requires more money.

Mr. SLEMP. But still you had on hand, as you say, on December 31, \$98,000.

Col. SHERRILL. That is true, but that money is largely spent both in the very large number of districts, some 15 or 20 districts, and also spent in the office of the Chief of Engineers, and in that period we figure that that money will be used up to give us the absolutely necessary supplies.

Mr. SLEMP. Do you purchase the spare parts out of this appropriation?

Col. SHERRILL. Spare parts and all kinds of supplies, like carbon and replacements and everything that goes with that.

Mr. SLEMP. Have you made a careful investigation of the searchlight supplies that were brought back from France?

Col. SHERRILL. Yes, sir; all those supplies have been converted into the stock in hand.

Mr. SLEMP. What has become of them?

Col. SHERRILL. But you understand the number of searchlights we actually used in France was not very large as compared with the total number we have in our fortifications. This appropriation is not only for replacements and so on, but is for the actual operation of these things and everything that goes with it—the oil and all the supplies. The main reason why we need this fund is because in 1920 we asked for \$100,000 and we got \$50,000, and we had to use up a large part of our war reserve on that account. We have to keep a certain amount of war reserve in this material. One of the principal items is taking care of the power requirements of all these new emplacements. You see, we have 24 new emplacements, each of which has its power set, and necessity for maintaining and keeping up that set, and the actual running of them. Therefore, you see the conditions have very much changed since those years in which the appropriation, as you indicate, was \$40,000, and we have a very large project for the installation of additional searchlights and for power plants going into the seacoast defenses.

Mr. SLEMP. You refer to those kilowatt sets?

Col. SHERRILL. Yes; and we are going to add about 101 searchlights between now and the end of the succeeding fiscal year in the coast defenses. There is nothing asked for here that we do not absolutely need. For instance, the coast-defense commanders make their requests for these supplies. The district officers carefully examine those, and certainly none is authorized or issued that is not absolutely essential. I would like for Gen. Coe to speak about that, because he knows the detailed reasons as to why this fund is necessary. It is not only to keep up the searchlights, but to keep them actually going.

Gen. COE. I can not state as to the exact figures in the estimate, Mr. Slemp, although I can state that our needs in that respect are certainly greater than they have been before, for this reason, that up to the present time we have had a marked deficiency in our searchlights, and it is necessary not only to keep the plants in running order but also to keep a certain amount of material on hand for the actual operation of them in the drills and during night target practice, which we frequently have. We have night target practice whenever conditions will permit, and a great deal of material is needed during those times in the way of carbon and gasoline.

Col. SHERRILL. Another point, Mr. Slemp, is that most of these lights that were used in France were of an entirely different type from the type used in the coast defenses.

Mr. SLEMP. You are prepared to state that you have taken into consideration all the parts that were brought back from France and

Col. SHERRILL. I have made no personal investigation, but that is made by our supply section; yes, sir.

Mr. SLEMP. And you utilized that material wherever it was possible to do so?

Col. SHERRILL. Yes, sir; that is put right into our supplies.

Mr. SLEMP. That would go into your war reserve?

Col. SHERRILL. Yes.

Mr. SLEMP. Do you expect to spend your balance of \$98,000 during this fiscal year?

Col. SHERRILL. Yes, sir.

Mr. FRENCH. These recurring items showing wages and compensation are stated pursuant to a statutory requirement, are they not?

Col. SHERRILL. Statutory; yes, sir. We do not see, as you said, the necessity for it, and we would be very glad to put in something that is more appropriate to your consideration, if that could be done; but this is statutory, and we have to do it.

Mr. SLEMP. The installation of searchlights comes under another appropriation?

Col. SHERRILL. Yes, sir.

MINING CASEMATES, CABLE GALLERIES, ETC., FOR SUBMARINE MINES IN THE UNITED STATES.

Mr. SLEMP. The next item is:

For construction of mining casemates, cable galleries, torpedo storehouses, cable tanks, and other structures necessary for the operation, preservation, and care of submarine mines and their accessories, and for providing channels for access to torpedo wharves, \$860,000.

You have reduced your estimate to \$773,848, and, as I understand, last year you had available \$334,000, in addition to the \$400,000 that was repealed. What did you do with that \$334,000 and what is the state of your balances?

Col. SHERRILL. The state of our balances was \$145,979.67 on December 31, 1919, and it was estimated that that sum would be expended before the end of the fiscal year.

Mr. SLEMP. Has it been allotted?

Col. SHERRILL. It has all been allotted except \$2,763.57.

Mr. BYRNS. How much did you have at the beginning of the fiscal year?

Col. SHERRILL. We had \$324,000, I believe.

Mr. SLEMP. Will you make a brief statement as to how you expended that money?

Col. SHERRILL. I have tabulated here the different items on which we have used this fund. The first is Portland, Me., remodeling casemate——

Mr. SLEMP (interposing). Just insert that tabulation in the record.

Col. SHERRILL. Very well.

Casemates, galleries, etc., for submarine mines.

	Fortification acts.	Act June 15 1917.
Unallotted balance Mar. 1, 1919.....	\$447,090.70	\$80,773.70
Allotted, Mar. 4, 1919, to district engineer, Portland, Me., for modifications and additions to cable tank, crane runway, and loading-room doors, etc.....		4,750.00
		<hr/> 76,023.70
Mar. 20, 1919, reported to the Secretary of War to be turned in to the Treasury in accordance with the provisions of the fortification appropriation act of Mar. 3, 1919.....	323,976.30	76,023.70
Total.....	123,114.40	
Allotted, Apr. 15, 1919, to district engineer, Port- land, Me., to cover cost of fitting cable tank at Fort Constitution for handling larger reels.....	4,000.00	
Total.....	119,114.40	

	Fortification acts.	Act June 15, 1917.
Allotted, Apr. 17, 1919, to district engineer, Boston, Mass., for completing bombproofing protection for mining casemate at Fort Strong, Mass-----	\$8,000.00	
Total-----	111,114.40	
Allotted, Apr. 21, 1919, to district engineer, New London, Conn., to cover cost of completing mining casemate and switchboard room, Fort H. G. Wright-----	9,200.00	
Total-----	101,914.40	
Allotted, May 3, 1919, to district engineer, Portland, Me., to cover cost of cable hut, Fort Williams, Me--	1,214.36	
Total-----	100,700.04	
Allotted, May 28, 1919, to district engineer, Boston, Mass., for bombproofing mining casemate Fort Warren-----	8,500.00	
Total-----	92,200.04	
Allotted, June 3, 1919, to district engineer, second district, New York City, for alteration of one cable tank at Fort Totten, N. Y-----	450.00	
Total-----	91,750.04	
Allotted, June 11, 1919, to district engineer, Portland, Me., to cover additional cost of cable tank at Fort Constitution, N. H-----	1,000.00	
Total-----	90,750.04	
Allotted, July 3, 1919, to district engineer, Portland, Me., to cover cost of construction of testing room at Fort McKinley cable tank-----	600.00	
Total-----	90,150.04	
Allotted, July 29, 1919, to district engineer, Jacksonville, Fla., to cover additional cost of bombproofing mining casemates at Fort Dade, Fla-----	14,000.00	
Total-----	76,150.04	
Allotted, July 29, 1919, to district engineer, Charleston, S. C., to cover additional cost of bombproofing mining casemate at Fort Moultrie-----	800.00	
Total-----	75,350.04	
Allotted, Aug. 14, 1919, to district engineer, Baltimore, Md., for additional for rearrangement and protection of mining casemate at Fort Howard---	1,000.00	
Total-----	74,350.04	
Revocation, Aug. 18, 1919, from district engineer, Los Angeles, Calif., balance of allotment of Apr. 5, 1917, for construction of storage magazine and mining casemate for mine defense of Los Angeles Harbor-----	5,877.53	
Total-----	80,227.57	
Allotted, Sept. 18, 1919, to district engineer, Newport, R. I., to cover cost of placing mining casemate in Battery Mitchell, Fort Greble, and Battery Zook, Fort Wetherill-----	24,280.00	
Total-----	55,947.57	

	Fortification acts.	Act June 15, 1917.
Allotted, Sept. 20, 1919, to district engineer, Savannah, Ga., for bulkhead and additional outlet to cable tank, Fort Screven-----	\$354. 00	
Total-----	55, 593. 57	
Allotted Sept. 23, 1919, to district engineer, Boston, Mass., additional funds for bombproofing the Fort Warren casemate-----	3, 500. 00	
Total-----	52, 093. 57	
Allotted, Sept. 27, 1919, to district engineer, Portland, Me., additional funds for remodeling mining casemates, Fort McKinley, Me-----	800. 00	
Total-----	51, 293. 57	
Allotted, Sept. 27, 1919, to district engineer, Portland, Me., additional funds for completing casemate at Fort Williams, Me-----	2, 500. 00	
Total-----	48, 793. 57	
Allotted, Oct. 7, 1919, to district engineer, New London, Conn., for construction of a bombproof casemate at Fort Terry, N. Y-----	42, 500. 00	
Total-----	6, 293. 57	
Allotted, Oct. 11, 1919, to district engineer, Charleston, S. C., to construct a concrete partition wall in in cable tank, Fort Moultrie-----	300. 00	
Total-----	5, 993. 57	
Allotted, Nov. 8, 1919, to district engineer, Norfolk, Va., to cover increased cost of bombproofing mining casemate at Fort Monroe, Va-----	3, 230. 00	
Total-----	2, 763. 57	
Revocation, Apr. 2, 1919, from district engineer, Los Angeles, Calif., from allotment of Sept. 8, 1917, for additional protection for mining casemate at Fort Rosecrans, Calif-----		\$1, 785. 64
Allotted, May 3, 1919, to district engineer, Portland, Me., to cover cost of constructing cable hut, Fort Williams, Me-----		1, 785. 64
Revocation, Feb. 9, 1920, from district engineer, New London, Conn., deposited (refund) and report received from Director of Finance, Dec. 26, 1919----		952. 75
Unallotted balance, Feb. 29, 1920-----	2, 763. 57	952. 75

Gen. COE. All existing projects, including their equipment, are practically finished propositions.

Col. SHERRILL. Except the one at Cape Henry.

Gen. COE. I was going to explain as to Cape Henry.

Mr. SLEMP. Does that mean that you have the mine materials and supplies on hand?

Gen. COE. Yes.

Mr. SLEMP. Everything for planting the mines?

Gen. COE. Yes, sir.

Mr. SLEMP. For every recognized mine project along the coast of the United States?

Gen. COE. Yes, sir.

FORT STORY MINE PROJECT.

Mr. FRENCH. Are we to eliminate the item of \$693,000 for the mine project at Fort Story?

Col. SHERRILL. With a partial exception, which I will give you. The statement Gen. Coe has just made to me is that we eliminate the submarine mine defense project of \$693,000 at the entrance to Chesapeake Bay except the first item, the casemate, at \$76,933; that is the big item in this estimate and that is to be eliminated. Gen. Coe will give you the detailed reasons.

Gen. COE. I will take up the question of mining the entrance to Chesapeake Bay, but before going to that I would like to say that the statement I made with reference to the completion of the projects included the items that are in this year's bill. In answer to your question of a moment ago we think the entrance to Chesapeake Bay is the most important mining project in the whole continental United States. It has been studied for some time, and it has presented many difficulties.

The most important difficulty was the question of a wharf at Fort Story. Storms in that vicinity and the fact that no protected location is available made it impossible to find a place where a wharf could be put at a reasonable cost. We also took the matter up with the Navy Department and an agreement has been reached by which the controlled mine area has been materially reduced over any previous proposition—that is, the Navy has agreed to mine a portion of the entrance with contact mines so that only the necessary channel is to be covered by controlled mines which are planted by the Coast Artillery. Since these estimates were submitted for this project, further careful study of the subject has convinced us that we can mine the entrance to Chesapeake Bay—that is, the line between Cape Henry and Cape Charles—from a mining base at Fort Monroe. We have certain storage facilities at Fort Monroe which can be utilized and others which can be improvised, so that we can install the mine project for the defense of the Cape Henry-Cape Charles line from Fort Monroe as a base. That will permit the elimination from the estimates of all items except for the completion of the casemate and fire control and accessories, \$40,000; those two items I would like to have remain in the bill because they must be located at Fort Story and are for the control of the mine system after it is once installed.

Mr. SLEMP. Have you a full complement of accessories, cables, and so on, at Fort Monroe for the mining of this area?

Gen. COE. We will have to increase the capacity of certain of our accessories there, but whether we can do that by improvising we are not entirely sure; eventually we may have to ask for some small appropriations for increasing our facilities there, but we think the loading room is ample; we believe we can store the cable and we believe we can utilize the temporary construction, which is in good condition, for other storage purposes, and probably handle the thing without any material additional expense.

Mr. SLEMP. Will the mines be controlled from Fort Story?

Gen. COE. They will be controlled from Fort Storey as soon as they are planted, and that must be done. The casemate is under con-

struction now and Col. Sherrill can probably tell you what percentage of it has been completed.

Mr. SLEMP. The casemate is being built at Fort Story now?

Gen. COE. It is being constructed there now.

Mr. SLEMP. How much money have you spent on it?

Col. SHERRILL. That casemate has had allotted \$76,933, expended \$75,352.66, leaving a balance of \$1,580.34, which will probably be sufficient to complete it.

Mr. SLEMP. Then you do not need any money for that next year?

Col. SHERRILL. No; we have previously deducted that. But for the facilities that Gen. Coe speaks of we would like to include an item of \$100,000, which would make a deduction of \$593,000 on account of the change of the project back to Fort Monroe.

Mr. BYRNS. That is, from the estimate as submitted?

Col. SHERRILL. Yes, sir.

Mr. BYRNS. In other words, you are eliminating \$593,000?

Col. SHERRILL. Yes, sir; on account of moving back from Fort Story, and the difficult conditions out there, to Fort Monroe.

Mr. BYRNS. That will make how much in all?

Col. SHERRILL. \$180,848 instead of \$773,848.

Capt. GARLINGTON. We can give you the items still remaining if you want them?

DETAILS OF REVISED ESTIMATE.

Col. SHERRILL. I will take up the items on which this estimate is based. Narragansett Bay, additions to mine storehouse, Fort Greble, \$10,000; completion of mining casemates at Battery Zook, Fort Wetherill, and Battery Mitchell, Fort Greble, \$10,000; Long Island Sound, completion of casemate at Fort Terry, \$22,500. You do not want me to mention, I suppose, those we dropped.

Mr. SLEMP. Are they to be dropped permanently?

Col. SHERRILL. No, sir.

Gen. COE. Yes; it is intended to drop those permanently.

Col. SHERRILL. I think you will find we will need some of those.

Gen. COE. No; we will not need those three items at Fort Totten, at Fort Wadsworth, and the bombproof mining casemate at Fort Monroe. Those will never be resubmitted.

Mr. BYRNS. Let me understand this. Under the revised estimates as submitted there is the sum of \$773,848, and I understand there is a still further reduction to \$180,848?

Col. SHERRILL. That is right, sir.

Mr. BYRNS. What I would like to have, if Mr. Slemp approves, is a statement as to just how you expect to expend that \$180,848?

Col. SHERRILL. I have been reading that.

Mr. BYRNS. But you have not completed the list?

Col. SHERRILL. No. Eastern New York, bombproofing casemate, Fort Totten, \$20,000, to be dropped; southern New York, bombproofing casemate, Fort Wadsworth, \$29,000, to be dropped; Sandy Hook, bombproofing casemate, Fort Hancock, \$38,348; Chesapeake Bay, completion of bombproof cover for mining casemate, Fort Monroe, \$22,090, to be dropped; entrance to Chesapeake Bay, submarine mine defense project, \$693,000, to be dropped—that is, \$593,000 is dropped.

Mr. BYRNS. In other words, it is reduced to \$100,000?

Col. SHERRILL. Yes, sir; leaving the amount estimated \$100,000. This change is made possible by decision of the Chief of Coast Artillery to withdraw the Fort Story position to Fort Monroe, allowing the elimination of combined storehouses, cable tank and loading room, \$370,000; wharf and bulkhead, \$200,000. Pensacola, completion of combined casemate and switchboard room, \$12,000, to be dropped. That is the total of all work contemplated for the completion of the present submarine mine defense projects for the United States.

Mr. SLEMP. In dropping various projects do you feel you have endangered our security in any way or minimized our defense possibilities?

Col. SHERRILL. No, sir; that has been done as a result of considerations between the Army and the Navy as to the relative functions of the two services.

Mr. SLEMP. Take Pensacola, for example?

Col. SHERRILL. The Navy has taken over certain additional mine projects and the Army has withdrawn their requirements accordingly. Gen. Coe can give you the details of what the Navy proposes to do.

Mr. SLEMP. Gen. Coe, take the four items that you dropped, and explain why you do that?

Gen. COE. First, take the bombproofing of casemate at Fort Totten. That means that the mining casemate which controls the mines is not thoroughly protected from gunfire at Fort Totten, but it is almost beyond our ability to conceive of Fort Totten ever being brought under gunfire unless disaster is facing this country, and in that case the mine field there would be of no value. It is really a mine field which might be abandoned, but as long as we have the material and the operating plant to maintain it we have not recommended its being abandoned at this time, but we do not feel that \$22,500 should be added simply for protection against possible gunfire; it might be under fire for a very long time before a projectile would hit the casemate, and even so the mine field might still be susceptible of being operated, if such a thing were necessary. You see, the mine projects for the continental United States were made when the lines of defense were much more withdrawn than they are at present. The same remarks apply to the bombproofing of the casemate at Fort Wadsworth. Our important mining elements are at Fort Hancock, and we ask to have that place protected because that is on the outer line. As to Pensacola, the importance of the mine project is not sufficient to warrant bombproofing that casemate; and I think that covers all the items.

Mr. BYRNS. As I understand it, the appropriation of this \$180,000 will complete the entire work in contemplation with reference to the mining of our coast defenses so far as it is considered desirable and necessary for the complete protection of our defenses.

Col. SHERRILL. Yes, sir; it will. We believe it will complete all of the engineering structures or all of the engineering work involved in mine projects.

PROCUREMENT OR RECLAMATION OF LAND NEEDED FOR SITE, LOCATION, ETC., OF WORKS FOR FORTIFICATIONS AND COAST DEFENSES.

Mr. SLEMP. The next item in the bill is, "For procurement or reclamation of land, or rights pertaining thereto, needed for site, location, construction, or prosecution of works for fortifications and coast defenses, \$15,000." There is also a supplemental estimate for this purpose in House Document 677 of \$34,000. You asked for \$15,000 last year, and you did not get anything. You had an appropriation of \$20,540 repealed in 1919. Have you any money on hand out of this appropriation now?

Col. SHERRILL. Yes, sir; we have available as of December 31, 1919, \$93,346.68. The estimated expenditure up to the end of the fiscal year is \$30,000. That was the estimate at that date, but since then we have found that we are prohibited by the provisions in the Army act of last year from spending any of this money for sites, and the comptroller has decided adversely to our contention that this money was specifically appropriated for that purpose and that we should be allowed to go ahead and spend it. Consequently, all of our purchases of sites were stopped, and we could not spend any of that money. Therefore, there will lapse at the end of the year \$93,340.68, or approximately that, and this is in the nature of a reappropriation.

The CHAIRMAN. You are requesting a total of \$49,000 of this \$93,000 to be returned to you?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. What is proposed to be done with the \$49,000?

DETAILS OF ESTIMATE.

Col. SHERRILL. The Army appropriation act of July 11, 1919, contained a proviso prohibiting the use of appropriations for the support of the Army or the Military Establishment for the acquisition of real estate. It being the opinion of the Chief of Engineers that this proviso applied only to appropriations carried in the Army act and was not intended to apply to fortification appropriations specifically authorizing the acquisition of land, the acquisition of sites for which negotiations were in progress July 11, 1919, was continued by this office. The applicability of fortifications appropriations to this purpose has been brought into question, however, and a recent decision of the War Department is to the effect that the provision of the Army act of July 11, 1919, above referred to, applies to fortifications appropriations as well as to Army appropriations, and the proceedings for the acquisition of all fortification sites have accordingly been ordered terminated. This decision necessitates the resubmission, for specific authority by Congress, of all estimates for the acquisition of land immediately required for fortification purposes.

EXTENSION OF FORT M'ARTHUR RESERVATION.

The original estimate of \$15,000 was submitted to cover the cost of acquiring a small tract of land adjacent to the Fort McArthur Reservation which is required in order to enable the Government to secure the removal of several water towers which obstruct the field

of fire of one of the 14-inch batteries at that fort. Under authority of the House Appropriations Committee, contained in a letter of Hon. James W. Good, chairman, dated June 15, 1919, negotiations were entered into with the owners of the land and an offer therefor made, the acceptance of which has been authorized by the department. The sum of \$7,000 has been allotted to the district engineer to cover the cost of the land and incidental expenses. The negotiations conducted with the owners of the land originally contemplated that in the event of the transfer of the site, the United States would replace the existing water-supply system which would become inoperative by the removal of the water tanks. Subsequently, however, the section supplied by this system was annexed to the city of Los Angeles, and it is anticipated that the city water-supply system will be extended to include this section. The delay incident to the annexation proceedings made it appear that it would not be possible to complete the acquisition of the land prior to the close of the current fiscal year, and the estimate of \$15,000 was accordingly submitted for 1921. While this condition no longer exists, the decision as to the application of the prohibition clause in the Army act of July 11, 1919, makes it necessary that this item be retained. Deeds have been prepared and are now in escrow pending completion of abstract of title which is now being prepared.

Mr. BYRNS. How much land is involved in this?

Col. SHERRILL. We have not the acreage of that land here.

Mr. BYRNS. Can you insert that information in the record?

Col. SHERRILL. I will do so.

Mr. BYRNS. How much is to be expended for lands? Did you say \$7,000?

Col. SHERRILL. \$7,000 has been allotted for the purchase of land, but it will not complete it.

Mr. BYRNS. Do you contemplate buying more land now than when the allotment was made?

Col. SHERRILL. That was not a complete allotment. That was a partial allotment. We will include in the statement that we insert in the record just what acreage is to be acquired. These are the original figures, and they have not been changed.

Mr. SLEMP. This is really for carrying out a contract that you have entered into?

Col. SHERRILL. Yes, sir; it is held up and stopped.

MIDDLE BREWSTER ISLAND, BOSTON, MASS., PURCHASE OF LAND.

This estimate in the sum of \$34,000 is submitted to cover the cost of acquiring the following sites: Middle Brewster Island, Boston, Mass.; \$30,000. The acquisition of Middle Brewster Island is required to provide a site for accessories for 16-inch armament, the emplacement of which on Calf Island is contemplated. Condemnation proceedings for this purpose have been in progress since 1917, and have not yet been completed. On account of the decision of the War Department above referred to, this item is resubmitted for specific authority of Congress.

Mr. BYRNS. Do I understand that the Middle Brewster Island condemnation proceedings have been entered already?

Col. SHERRILL. They are entered.

Mr. BYRNS. How much did you estimate for that?

Col. SHERRILL. \$30,000.

Mr. SLEMP. Can you give the acreage and a statement showing the topographic characteristics of the tract of land for which you estimate \$30,000?

FORT CROCKETT RESERVATION, GALVESTON, TEX., PURCHASE OF LAND.

Col. SHERRILL. We will insert that in the record.

The next item is borrow pit site, Galveston, \$4,000. This site is required to provide a borrow pit from which sand may be secured for use in connection with the filling of the Fort Crockett Reservation at Galveston, funds for the latter purpose having been appropriated in the fortification act of July 6, 1916. Deeds have been prepared and are now with the Attorney General for an expression of opinion. The submission of this item is required on account of the decision above referred to.

Sites for fortifications, 1921 estimates.

Locality.	Acreage.	Estimate.
Los Angeles.....	6 small lots and part of the seventh; exact acreage not determined.	\$15,000
Middle Brewster Island, Boston, Mass.....	12.035 acres.....	30,000
Galveston, Tex.....	12 acres, approximately.....	4,000
Total.....		49,000

CONSTRUCTION OF LAND DEFENSES, UNITED STATES.

Mr. SLEMP. The next item is:

For the construction of land defenses in the United States, including the procurement of equipment and materials required therefor, the construction and repair of roads required for military purposes, and the procurement and installation of searchlights, \$20,000.

Col. SHERRILL. Mr. Chairman, I would like very much to have that wording retained in the bill, but we want to cut out the estimate. We would be glad if the committee would let us retain in there \$100 or some nominal sum simply for the purpose of retaining the wording.

Mr. SLEMP. Can you give us a little statement about the expenditure of the \$60,000 appropriated for the current fiscal year? You had an appropriation for 1918 of \$2,000,000, and in 1919 there was repealed of that appropriation \$1,960,000. You were given \$60,000 last year. Have you any money on hand out of that appropriation?

FENCING FORTIFICATION RESERVATIONS.

Col. SHERRILL. We have \$49,593.17, but it is estimated that all of that will be expended before the end of the fiscal year. One million nine hundred and sixty thousand dollars of the appropriation for the purchase of materials and for the construction of land defenses was withdrawn by the act of July 8, 1918. That particular item of

\$60,000 was appropriated mainly for the construction of wire fences at various places throughout the United States.

Mr. SLEMP. Do you not think that it is unnecessary to use that money for that purpose?

Col. SHERRILL. We are not asking for any for that purpose. We are cutting that out.

Mr. SLEMP. You have \$49,000 still left that you are going to use that way, have you not?

Col. SHERRILL. That is for completing projects that are under way. Some of those projects are not by any means unnecessary, but we are cutting them out, because we do not want to extend them in any way.

Mr. SLEMP. Give us a statement of that.

Col. SHERRILL. We have some small outlying stations isolated from the coast defenses, and there is a certain amount of valuable property in those stations. It is either a question of maintaining a detachment of men to take care of that property at considerable expense, or else you must, at least, put an enclosure around them.

Mr. SLEMP. Are there many places where that condition exists?

Col. SHERRILL. That condition exists, I should say, at practically all the fortifications. It exists at Portland, Me.; Newport, R. I.—

Mr. SLEMP (interposing). Have you many outlying places or stations at those fortifications?

Col. SHERRILL. Yes, sir; you must have them widely extended for fire-control purposes. That is what they were designed for. This was designed originally to make it easier to watch this property during the war.

Mr. SLEMP. We never began on this theory until two years ago.

Col. SHERRILL. This fencing proposition came up during the war because of the necessity of making these outlying stations more easily guarded. They were afraid all the time of malicious damage that might be done by spies. By putting fences around the property, of course, complete protection was not afforded, but it made it easier to guard the places. The sentinel, for instance, could see whether anybody had been tinkering with the fence. It is still desirable to have these fences to inclose these tracts, separating them from property owned by somebody else. However, we do not think that it is desirable to extend the work further at this time.

Mr. OGDEN. Has that \$49,000 been obligated?

Col. SHERRILL. There was unallotted on February 29, 1920, \$1,600. That means that it has been out in the hands of the district officers, and that they have been actively spending this money right along on works that are under way.

Mr. OGDEN. The estimate of \$20,000 is withdrawn?

Col. SHERRILL. I would like to have that changed to a nominal sum, like \$100, simply to hold the wording in the appropriation act.

SHORE PROTECTION, SANDY HOOK RESERVATION.

Mr. SLEMP. For the protection of the shore of the Sandy Hook Reservation, \$544,000 was appropriated last year. How are you getting along with that work?

Col. SHERRILL. The present status of the appropriation for the shore protection of Sandy Hook, N. Y., authorized and appropriated by the act of March 3, 1919, amounting to \$544,000 is as follows: The available balance on November 30, 1919, was \$48,680.80. The project contemplated the protection of the shore of the Sandy Hook Reservation by enlarging and extending the existing seawall at the southern end of the reservation. Contract for placing about 120,000 tons of stone and construction extension of seawall entered into September 17, 1919, and approved October 4, 1919. About 5 per cent of the work had been completed November 30, 1919.

Mr. SLEMP. Do you think you will complete that project as per the engineer's statement here within that amount of money?

Col. SHERRILL. Yes, sir; we expect to accomplish the amount of work that we have heretofore reported to the committee for the sum indicated.

Mr. SLEMP. Of course, that work will run over into the next fiscal year?

Col. SHERRILL. Yes, sir; it will take all of next year.

Mr. SLEMP. I take it that it will be completed by June 30, 1921?

Col. SHERRILL. Yes, sir. That appropriation is not included in this bill, and, therefore, I do not have it in our list.

INSTALLATION AND REPLACEMENT OF ELECTRIC-LIGHT AND POWER PLANTS, AND PURCHASE AND INSTALLATION OF SEARCHLIGHTS AT SEACOAST DEFENSES IN THE UNITED STATES.

Mr. SLEMP. The next item is:

For the installation and replacement of electric-light and power plants at seacoast fortifications in the United States; the purchase and installation of searchlights for seacoast defenses in the United States, including searchlights for antiaircraft defenses and accessories therefor; and the procurement and installation of sound-ranging equipment for use in the United States, the insular possessions, and the Panama Canal, and for salaries of electrical experts, engineers, and other employees necessary to procure and install the same, \$3,218,500.

Colonel, as I understand, the consolidated balance as of March 3, 1919, provided for in that bill was \$3,615,130 and there was repealed \$1,250,000, leaving in the fund \$2,365,130.

Col. SHERRILL. The present status of that appropriation is that on the 31st of December, 1919, there was an unexpended balance remaining of \$3,797,798.34; estimated expenditures up to the end of the fiscal year, \$1,537,747.65, leaving an estimated balance to be turned into the Treasury of \$2,260,050.69.

Mr. SLEMP. The draft of the bill indicates that you only had \$2,365,130, whereas you really had \$3,797,798.34.

Col. SHERRILL. According to our figures; yes, sir.

Mr. SLEMP. Does that take into consideration the repeal of \$1,250,000?

PROCUREMENT AND INSTALLATION OF SOUND-RANGING EQUIPMENT IN THE UNITED STATES—TRANSFER OF TO COAST ARTILLERY CORPS.

Col. SHERRILL. Yes. I do not know where that discrepancy occurs because ours is taken from the books, and I am sure it is correct.

I would like to submit to the chairman of the subcommittee a letter signed by the Secretary of War requesting a modification of the wording of this particular item to take care of certain new developments that are under way, and which it is desirable to have available in the hands of the Chief of Coast Artillery in connection with this subaqueous range-finding matter. I will read the letter:

MARCH 22, 1920.

The CHAIRMAN COMMITTEE ON APPROPRIATIONS,

House of Representatives.

SIR: 1. Since the submission of the annual estimates for the fiscal year 1921, the duty of organizing and maintaining sound ranging and flash ranging for the Army has been transferred from the Corps of Engineers to the Coast Artillery Corps. The subaqueous-listening devices, formerly installed by the Navy Department, have also been taken over by the War Department, and their operation has been assigned to the Coast Artillery Corps.

2. These changes make desirable slight changes in the wording of certain items in the fortification bill, and the following changes are accordingly brought to your attention as desirable for incorporation in the next fortification bill:

(a) On page 34 of the subcommittee print, the text should read as follows:

"For the installation and replacement of electric light and power plants at seacoast fortifications in the United States; the purchase and installation of searchlights for seacoast defenses in the United States, including searchlights for antiaircraft defenses and accessories therefor; and for salaries of electrical experts, engineers, and other employees necessary to procure and install the same. \$3,218,500."

The reason for this omission is the fact that that is going to be placed over under the Chief of Coast Artillery.

Mr. SLEMP. And he would estimate for it?

Col. SHERRILL. Yes. [Continuing reading:]

(b) On page 46 of the subcommittee print the text should read as follows:

"Under the Chief of Coast Artillery: For construction of fire-control stations and accessories, including purchase of lands and rights of way, purchase and installation of necessary lines and means of electrical communication, including telephones, dial and other telegraphs, wiring and all special instruments, apparatus, and materials, coast-signal apparatus, subaqueous, sound and flash ranging apparatus, including their development, and salaries of electrical experts, engineers, and other necessary employees connected with the use of coast artillery; purchase, manufacture, and test of range finders and other instruments for fire control at fortifications, and the machinery necessary for their manufacture at the arsenals, \$1,698,508."

(c) On page 75 of the subcommittee print the text should read as follows:

"Under the Chief of Coast Artillery: For construction of fire-control stations and accessories, including purchase of lands and rights of way, purchase and installation of necessary lines and means of electrical communication, including telephones, dial and other telegraphs, wiring and all special instruments, apparatus, and materials, coast-signal apparatus, subaqueous, sound and flash ranging apparatus, including their development, and salaries of electrical experts, engineers, and other necessary employees connected with the use of coast artillery; purchase, manufacture, and test of range finders and other instruments for fire control at fortifications, and the machinery necessary for their manufacture at the arsenals, \$273,350."

(d) On page 87 of the subcommittee print the text should read as follows:

"Under the Chief of Coast Artillery: For the construction of fire-control stations, the purchase and installation of accessories therefor, and for subaqueous, sound and flash ranging apparatus, including their development, \$474,001."

Very respectfully,

NEWTON D. BAKER, *Secretary of War.*

Mr. SLEMP. Now, give us a financial statement of the money you are expending and for what purpose, etc.

Col. SHERRILL. We have the same difficulty here we have had in the other appropriations because we have been expending the accumulated balances of two or three years during the year, and, therefore, have not that data segregated under the actual year in which it was spent.

Mr. SLEMP. Have you installed any new electric light and power plants this year?

Col. SHERRILL. Oh, yes, sir; we have a list of those. I do not know, Mr. Slemp, whether this will be a complete statement, but starting virtually with the act of 1916, coming up to date, covering all the acts under which we had balances for any cause that would be carried forward—you see, for instance, there might be some money returned to our control and so on, and we have taken all those and given the complete status of what work is being done out of all those appropriations, and this work we have listed here comes under that head, and, therefore, it is very difficult to say what we have done out of this particular appropriation in this particular year. You see we have lumped it all in the last few years, from 1916 down to date, and we will have to give you a list of exactly what work we have done in each of those years.

Mr. SLEMP. Now, take your statement, for example, that you propose to spend between now and the end of this fiscal year over \$1,500,000; you know definitely what that is to be expended for, do you not?

Col. SHERRILL. Yes, sir; we have the definite information but I do not think we have it with us. I will give you the status of work and that will give you practically what you want.

Portland, Me., Fort Williams, installation of two 25-kilowatt generating sets at Battery deHart and one 25-kilowatt set at Battery Sullivan. Excavations at Battery deHart completed, concrete work 95 per cent completed; work at Battery Sullivan commenced.

Fort Leavitt, installation of one 25-kilowatt generating set at Battery Kendrick, 90 per cent completed. Installation of one 25-kilowatt set at Battery Foote——

Mr. SLEMP. How many of these power plants do you propose to install this year?

Col. SHERRILL. I have that tabulated under the basis of estimates, each one in detail, showing exactly what we are going to do, and we have a table here showing in detail just what the status of the searchlights is.

Mr. SLEMP. The phraseology of this item takes in a great many things, for instance, installation and replacement of electric light and power plants, the purchase and installation of searchlights for seacoast defenses, including searchlights for antiaircraft defenses, and then the procurement and installation of sound-ranging equipment.

Capt. GARLINGTON. That we are asking to have cut out.

Mr. SLEMP. There are three different items there that it seems to me ought to be treated separately.

Col. SHERRILL. It would not be feasible to separate those because they are all so intimately connected. For instance, you take the electric light and power plant, and the purchase and installation of searchlights, they are absolutely tied together in these defenses.

Mr. SLEMP. Have you purchased any searchlights this year?

Col. SHERRILL. We have not purchased any at all during this year because we used those that came back from France, and we have had certain development work on mobile searchlight units for which I think the searchlights were already in existence last year. There has been, however, development work going on on searchlights up to this time as to improvements on the type of the dish-pan light, decreasing its weight and improving its mobility, and very recently a new design was completed of a mobile unit on a motor car which would carry the entire personnel operating the light, with all its facilities.

Mr. SLEMP. Suppose you just give us a statement of the use you propose to make of this money and put that statement in the record.

Mr. BYRNS. You had a total sum available last year of \$3,615,130, and \$1,250,000 was covered back into the Treasury by the last bill, leaving a balance in the fund of \$2,365,130.

Col. SHERRILL. Yes, sir; that is according to your figures in the book. Our balance, though, is shown to be very much larger than that.

Mr. BYRNS. What was your balance?

Col. SHERRILL. Our balance on December 31, 1919, was \$3,797,798.34, of which we estimate there will be turned back to the Treasury \$2,260,050.69, and one of the principal reasons why we have to ask for as much money as we do in this item that it is in the nature of a reappropriation where we have not been able to get the work done. Most of it, or a considerable part of it, is in that situation.

Mr. BYRNS. There is some of that appropriation that will be turned back into the Treasury?

Col. SHERRILL. \$2,260,050.69 is our estimate.

Mr. BYRNS. Would that be available during the next fiscal year, up to June 30, 1921?

Col. SHERRILL. As much of this sum as was available on December 31 will be available for obligation up to the end of the fiscal year, but on account of the method of work that we use in carrying out these searchlight projects, a comparatively limited amount of that will be obligated. Therefore this figure represents what we think will be turned back to the Treasury, \$2,260,050.69, not obligated at all.

Mr. BYRNS. Then if that sum were reappropriated you could get along with something less than \$1,000,000?

Col. SHERRILL. Yes, sir; most of this will be in the nature of a reappropriation. You see we are asking for \$3,218,500.

Mr. SLEMP. How much of the money you are spending this year is for light and power plants and how much for searchlights?

Col. SHERRILL. A very large proportion of it goes for light and power plants in connection with all these new batteries. We are installing the light and power plants and the wiring and everything that goes in connection with these 12-inch batteries.

STATEMENT OF EXPENDITURES.

The following statement shows the total expenditures under this appropriation since July 1, 1916, to include February 29, 1920, together with a list of the places where these expenditures have been made and an itemized statement of the character of work at each of these places:

Electrical and sound-ranging equipment, etc.
[Status of funds, Feb 28, 1920.]

Locality and work	Appropriations.				Allotments.			
	Act July 6, 1916.	Act Feb. 14, 1917.	Act June 15, 1917.	Total appropriated.	Act Mar. 3, 1905.	Act Mar. 4, 1911.	Act June 27, 1914.	Act Mar. 3, 1916.
Portland, Me.								
Fort Lovett, installing 25 kilowatt sets.								\$3,309.52
Installing 60-inch lights, Nos. 10 and 11.								3,000.00
Roston, Mass. Installing 25 kilowatt sets.					\$1,108.50			
Long Island Sound Fort II. C. Wright, installing 25 kilowatt sets.								
New York, N. Y. Installing generating set, Navasink High-lands.								485.17
Delaware Forts Saulsbury and Delaware, installing 25-kilowatt sets.								500.00
Sherry and Beck lights.								350.00
moving charter engine and replacing with								300.00
r house								
for gun, installing 25 kilowatt set.						\$27.76		125.00
Fort Rosecrans, 2 power houses and search-								2,265.00
lights Nos 16 and 17								972.24
bol. Purchase of equipment								5,940.73
PROJECT.								
San Diego, Calif.								
Electrical installation								950.00
Searchlight installation	\$127,500.00	\$69,045.00		\$69,045.00				69,687.92
Los Angeles, Calif.								
Electrical installation	99,200.00	40,955.00		40,955.00				
Searchlight installation.				99,200.00				
General								
Purchase 50-60 inch lights and supplying Sperry mech-		250,000.00		250,000.00				
anism								
Sound ranging equipment			\$5,900,000.00	5,900,000.00				
Purchase of 153 25-kilowatt sets and spares, and installation			1,700,000.00	1,700,000.00				
of same								
Total	226,700.00	360,000.00	7,600,000.00	8,186,700.00	1,108.50	27.76	512.10	77,885.58
Withdrawn by fortification act of Mar 3, 1919				1,250,000.00				
Net amount appropriated				6,936,700.00				

Locality and work.	Allotments				Total expenditure.	Balances of allotments.
	Act July 6, 1916.	Act Feb. 14, 1917.	Act June 15, 1917.	Electrical and sound-ranging equipment.		
Portland, Me.: Fort Lovett, installing 25 kilowatt sets.....			84,400.00	4200.00	87,900.52	
Fort Stark, installing 25 kilowatt sets.....			1,772.94	1,827.06	3,600.00	
Installing 60-inch lights, Nos. 10 and 11.....					3,000.00	
Exchanging lights, Nos. 6 and 8.....			500.00		500.00	
Electrical installations.....				44,100.00	15,427.18	528,662.82
			10,125.55	5,125.52	14,209.72	1,041.35
			3,142.46		4,240.96	
			65.00		65.00	
			393.20		393.20	
10.			1,000.00		1,000.00	
					50.32	
chlight.....	8500.00	8954.00			1,354.00	
Isaett Bay.....		4,190.00	65.93		4,900.00	
inch searchlights.....			580.00	424.07	580.00	
				39,900.00	39,900.00	25,394.31
witchboard, Fort Michie.....				400.00	400.00	400.00
Fort Hancock.....				1,714.83	1,900.86	336.41
anilton, and Hancock.....		300.00			300.00	
				766.00		766.00
				1,440.00	1,440.00	1,440.00
				148.50	148.50	
				28,000.00	12,031.23	15,968.77
					500.00	
					1,000.00	
		1,000.00		1,000.00	1,000.00	
		3,000.00			4,000.00	
				8,117.49	8,117.49	
				11,078.97	11,078.97	
ights 1 and 2, Sandy Hook.....				1,300.00	1,300.00	
				2,700.00	1,989.42	710.58
				1,200.00	1,200.00	982.85
					217.15	
standard gas-motor sets				2,500.00		2,500.00

FORTIFICATIONS APPROPRIATION BILL, 1921.

Electrical and sound-ranging equipment, etc.—Continued.

Locality and work	Allotments				Total expenditures	Balances of allotments.
	Act July 6, 1916.	Act Feb. 14, 1917.	Act June 15, 1917.	Electrical and sound-ranging equipment.		
25-kilowatt sets.				\$1,350.00	\$1,249.46	\$100.54
Kodman, Best, Torbert, and					682.85	1,517.35
ert, Arnold, and Gibson			\$1,600.00	2,200.00	1,600.00	
open	\$226.20			828.20	828.20	
				504.66	504.66	
				154.34	154.34	
				2,500.00	2,500.00	
1 Smallwood				8,947.00	5,279.53	3,667.47
ort Howard				1,075.00	1,075.00	
log engineer office				4,800.00	2,260.93	2,539.07
Cadillac open type.			275.00	275.00	275.00	
ner in central power plant				250.00	51.40	198.60
				150.00		150.00
			195.00	18,855.00	5,916.91	13,133.09
					300.00	
	91.91			91.91	91.91	
hlight installations		\$3,750.20		3,750.20	3,750.20	
		492.85		492.85	492.85	
				1,000.00	1,000.00	
				385.27	385.27	
				4,746.50	4,395.12	351.38
id Wool				6,005.40	6,005.40	
s, Battalions Caswell and Swift			2,811.39	7,469.11	6,719.34	3,561.16
Fort's Sumter and Moultrie			1,030.00	9,560.00	10,610.00	
engineer office				9,567.00	7,511.62	2,075.38
replacing with H. A. engine				2,000.00	2,000.00	
est and Tampa		980.70			125.00	
				79.30	3,325.00	
				21,643.00	4,341.92	17,301.08
	240.00			780.00	780.00	
Mobile, Ala.:			503.00	1,500.00	1,500.00	
Port Morgan, installing 25 kilowatt-set				5,540.00	1,952.41	3,587.59
at Fort Morgan						

FORTIFICATIONS APPROPRIATION BILL, 1921.

[illegible]

Summary.

Unallotted July 6, 1916.....	\$54,146.74
Paid in from prior allotments.....	48,491.62
Appropriated.....	8,186,700.00
Total available.....	5,389,338.36
Withdrawn by fortification act of Mar. 3, 1919.....	1,250,000.00
Net amount available.....	7,039,338.36
Allotted since July 6, 1916.....	5,620,655.40
Unallotted Feb. 29, 1920.....	1,418,682.96
Unexpended, Feb. 29, 1920.....	1,809,645.54
Total cash available, Feb. 29, 1920.....	3,228,328.50
NOTE. In accordance with the provisions of the act of July 8, 1918, the appropriation for "Electrical installations at seacoast fortifications," "searchlights for harbor defenses," and "searchlights for defensive purposes" have been combined in one appropriation, viz, "electrical and sound-ranging equipment, etc."	
Transferred to combined appropriation from:	
"Electrical installations at seacoast fortifications".....	\$109,653.96
"Electrical installations at seacoast fortifications, act June 15, 1917".....	1,074,253.89
"Searchlights for harbor defenses".....	308,820.33
"Searchlights for defensive purposes, act June 15, 1917".....	4,704,413.82
Total amount transferred to "Electrical and sound-ranging equipment, etc.".....	6,197,142.00

Col. SHERRILL. We are going to buy some tractor mount searchlights if we can do so before the end of the fiscal year, and this estimate also provides for purchasing additional ones during the coming year.

Mr. OGDEN. In the installation of the searchlight, what is the principal item of expense?

Col. SHERRILL. I should say that the procurement of the cable and the laying of the cable and the building of the shelters are the important things, and of course the towers are very expensive, especially where you have the necessity of having a disappearing tower or something like a bascule bridge that goes up like this [indicating]. When it comes to the searchlights which are mobile, of course, the expense there is in procuring the truck which carries that and the elevating device on that truck.

Mr. OGDEN. As to the cost of the cable, have you some idea as to what that is?

Col. SHERRILL. The power cable costs from 60 to 75 cents a foot and the controller cable costs about \$1 or \$1.50 a foot. You see that has a great many wires. It is 9-conductor cable and it makes quite a large cable, and is quite expensive, and of course these reach out to a considerable distance and increase the expense of the installation.

Mr. OGDEN. What type of searchlights do you propose to install?

Col. SHERRILL. We are installing now in the coast defenses the standard high intensity barrel light for fixed installations and we are using a certain number of Cadillac lights on motor cars where the site is sufficiently high to enable those to be used, and in certain other localities we have installed lights on wooden towers pending the development of the tractor light which we expect to have, a self-contained unit with an elevating tower itself.

Mr. OGDEN. I thought the barrel type had become obsolete and had been abandoned?

Col. SHERRILL. Not for seacoast defense work. The dish-pan light is a type of small weight and very desirable for field operations but in certain respects it is not so satisfactory as the barrel type for the seacoast defenses, and for all of our fixed installations we are using that type, principally because we have those on hand; we have a number of those lights available.

Mr. SLEMP. You are proposing to install a lot of searchlights at fixed places, but at the same time you are asking for a large sum of money for mobile types.

Col. SHERRILL. Yes, sir.

Mr. SLEMP. Do you think it is wise to go on with the installation of these old types of searchlights when you are preparing an entirely new one, much lighter and mobile, and having a larger ray carriage, as you might say?

Col. SHERRILL. Yes, sir. The Chief of Engineers and the Chief of Coast Artillery have been investigating for practically this entire year, and are now investigating, and have practically completed a statement of the present requirements for the coast defenses throughout the country, and those requirements are the basis of our estimates. The fundamental condition is that we are using the material we have as far as it is applicable. For instance, if we have a high

intensity barrel searchlight which will serve the purpose adequately in a fixed position we use it in a fixed position, but if there are conditions that absolutely require that that searchlight shall be mobile and it has to have a tower then we go into something different; we go to a tractor mount with a tower. That is the line on which we have been developing, and that is what a considerable part of this appropriation is for. The two tractor mounts that the Chief of Engineers has developed are practically completed; I think one will be turned over the 1st of May, the first one of the two.

DETAILS OF ESTIMATE.

Mr. SLEMP. I wish you would make a statement as to why you want \$3,218,500 appropriated for next year, or do you make a change in that?

Capt. GARLINGTON. We make a slight reduction.

Col. SHERRILL. There is a slight reduction. There is an item of \$62,500 which is classed as desirable but not essential; that is not a change of the project at all but it is a closer estimate of the amount that we will have completed at the end of the fiscal year, so that now we make the estimate \$3,156,250.

Mr. OGDEN. On what projects do you make the closer estimates?

Col. SHERRILL. New Bedford, installing one 25-kilowatt generating set and interconnecting fortification and post lighting systems at Fort Rodman, \$5,000; at Narragansett Bay, \$22,500 for electrical installations at Fort Adams, installing two sets, Battery Edgerton an interconnecting post and fortification systems; Fort Wetherill, installing one 25-kilowatt set each at Batteries Varnum and Wheaton and interconnect post and fortification systems; Fort Getty, install one 25-kilowatt set, Battery Tousard and interconnect fortification plants; Fort Kearny, install one set at Battery French; Fort Greble, install one set in central plant and two sets at Battery Mitchell and interconnect all plants. The district engineer states that this work will be completed April 30, 1920, so that is the basis of cutting that out. Then, at New York there is an item of \$15,750 for electrical installations, as follows: Fort Wadsworth, installing one set at Battery Ayres, two sets at Battery Richmond, one set at Battery Dix, and two sets at Battery Hudson; at Fort Hamilton, installing one set at Battery Brown, three sets for Batteries Neary and Doubleday; Fort Hancock, installing three sets for Batteries Richardson and Bloomfield. That is where that saving of \$15,750 was made.

Then there is a saving at Key West of \$4,000, completion of electrical installation work, consisting of installation of set at Battery Seminole, Fort Taylor, and interconnection with existing plant in rear of Battery De Leon; at Tampa an item of \$7,500 is indicated as saved or deducted, completion of electrical installations for battery lighting, the work consisting of the installation of one set at Battery Howard, Fort Dade, and interconnecting with post power plant; installing two sets in power house in rear of Battery Laidley, Fort De Soto, and rewiring Batteries Laidley and Bigelow. The funds were allotted September 2, 1919, and the district engineer estimates the work will be completed during the current fiscal year; at San Francisco an item of \$7,500, completion of electrical installa-

tions for battery lighting; and \$22,386 was allotted September 20, 1919, for installations at Batteries Godfrey, Saffold, and Stotensburg. Material has been ordered, but district engineer has not reported on date of completion. It is impracticable to make a general statement as to what is to be done, except by going over this in detail, because it is one succession of details of searchlight installations, battery wiring, and battery power, as indicated here. It is practically impossible to make it in a general way except by giving you a list of the items, some of which I have just read.

Mr. OGDEN. The revised estimate which you just gave will be sufficient to complete the installation of these electrical units?

Col. SHERRILL. We hope it will be, and we made it as close as we thought we would be safe in doing. You see, these conditions change constantly during the year, because as we get new reports we have to revise these figures, and we have done that as well as we could before your hearings, because we do not want to ask for any more money than we need nor for anything less than we need.

COMPLETING ELECTRICAL INSTALLATIONS.

Mr. SLEMP. You are asking \$166,250 for completing electrical installations. That means, I suppose, generating sets, etc.?

Col. SHERRILL. Generating sets, power plants, electrical wiring of the batteries, and so on.

Mr. SLEMP. Are you spending a lot of money for the duplication of power?

Gen. COE. If you mean by duplication whether it is possible to obtain all the power from some commercial plant in the vicinity, I think in certain cases these are duplications; there is no question about it, because it is possible to obtain it, but I can not say in what percentage of cases it is possible, perhaps in a larger percentage of cases than we have actually utilized the power. At many of our posts we do not utilize local power at all, but furnish our post lighting from our own system. This is carrying out a project which has long been before the committee; that is, providing plants in the batteries for the service of the batteries or adjacent batteries. We do not have to put a plant in every battery, but when we do put a plant in a battery it is fully protected from gunfire, and we utilize the power from that plant, which is thus protected, for as many batteries as it can serve. This is a very old proposition which has been put before the committee, and during the war, or just before the war, the necessary estimates were made to put the coast defenses on a proper basis the same as had always been presented to the committee, and which were considered reasonable, although we never had the money to do it.

Mr. SLEMP. It would seem to me that the power plants should be pretty well completed?

Gen. COE. They should be pretty well completed but I can not tell you exactly because I have not had a chance to get at the full details as to whether or not there may be other things needed and for which appropriations must be asked before completion.

Col. SHERRILL. This will practically complete this project for power except for new installations as they come along. But, as a general thing, this is the basis of a project worked out a number of years ago. It first contemplated, as far as possible, a central power

plant; then after further consideration of this matter it was found necessary to so connect up the batteries with their own power as to make them safe against reasonable casualties. This policy was worked out between the quartermaster general, who then handled post construction, the chief of engineers and the chief of coast artillery; they all agreed and worked out the project which is now being finally concluded.

TECHNICAL SERVICES, OFFICE OF CHIEF OF ENGINEERS.

Col. SHERRILL. The next item is, proportion of expenses of maintaining development section, office Chief of Engineers, \$50,000. The Army act of July 11, 1919, contains the following language:

Provided, That the services of skilled draftsmen, civil engineers, and such other services as the Secretary of War may deem necessary, may be employed only in the office of the Chief of Engineers to carry into effect the various appropriations for "Engineer equipment of troops," "Engineer operations in the field," and other military appropriations, to be paid from such appropriation: *Provided further*, That the expenditures on this account for the fiscal year 1920, shall not exceed \$225,000. The Secretary of War shall each year, in the annual estimates, report to Congress the number of persons who are employed, their duties, and amount paid each.

The development section is charged with development work in connection with the design of searchlights and searchlight mounts. and the amount estimated for 1921 is a fair charge for services on fortification work. That is this development work we have been speaking of.

SIXTY-INCH SEARCHLIGHTS, SECOND DEFENSES.

Mr. SLEMP. Another feature of that was 60-inch searchlights.

Col. SHERRILL. The next item is for the installation of 60-inch searchlights for seacoast defenses, as follows: Two steel tower installations at \$10,000, \$20,000—

Mr. BYRNS. Does that include the purchase of searchlights?

Col. SHERRILL. No; this is simply the installation.

Mr. BYRNS. The installation of searchlights already procured?

Col. SHERRILL. Yes, sir; and these are the items: Two steel tower installations; 34 installations on type C disappearing tower; 4 wooden tower installations; 1 push-car installation; 24 vertical lift installations, which are concealed and come up out of the ground.

Mr. BYRNS. Where are they to be installed?

Col. SHERRILL. I have a statement showing all of these projects and they are all approved projects, approved by everybody concerned, the Chief of Coast Artillery and the Chief of Engineers.

Mr. BYRNS. Will all of that money be expended next year?

Col. SHERRILL. Yes, sir; we hope to spend that money during the fiscal year.

Mr. SLEMP. Have you the searchlights on hand?

Col. SHERRILL. Yes, sir.

Mr. OGDEN. Is this new installation?

Col. SHERRILL. These are new installations, in completing a project we have been working on for some time; we are now getting to the point where, next year, we hope to complete it. Of course, a good deal of this work has been modified as a result of the war and while.

as I say, these installations are for projects that had been approved a long time ago, they have now been revised to meet new conditions.

Mr. SLEMP. Did you make many installations of searchlights during the war?

Col. SHERRILL. No, sir; and that is the reason we are behind. A great deal of that work was allowed to go over for several reasons. In the first place the Office of the Chief of Coast Artillery and the Office of the Chief of Engineers were thoroughly absorbed in work for troops abroad and, another thing, it was not considered essential to complete these basic projects at a time when all the energies of the country were engaged in that work. Therefore we allowed a great deal of the money to lapse.

Mr. SLEMP. Are all of these searchlights 60-inch lights?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. Are they of the Sperry type?

Col. SHERRILL. Yes, sir; and of high intensity and long range. As far as range is concerned they are the most effective we have; they are not of the light type, which are for mobile purposes, but they are effective.

Mr. SLEMP. Having a searchlight in position, why would it cost \$20,000 to put it up?

Col. SHERRILL. The ones you speak of are two at \$10,000 each.

Mr. SLEMP. I figure the cost at \$21,000.

Col. SHERRILL. That is the tractor type?

Mr. SLEMP. No; that is not the tractor type.

Col. SHERRILL. I see what you mean. There are 34 installations of the most expensive type on disappearing towers, and those cost to install \$25,000; but that gives perfect protection because you can put it behind a hill and rotate it in this direction [indicating]. It takes expensive mechanism to get those towers elevated in that way. Those towers are on the same principle as the Scherzer bridge, and this money is largely spent in purchasing these towers from the manufacturers. It is just simply based on the current prices of material, and they go from that down to \$10,000.

Mr. SLEMP. You have 34 of those expensive towers?

Col. SHERRILL. Yes, sir; that is the biggest item, amounting to \$850,000. Then we have four wooden towers that cost \$5,000 apiece, and the largest element of cost in those is getting the materials over to the site where these things are to be erected. Another item of expense that comes in on all of these is the fact that you have got to put these up frequently at isolated places, where it is difficult to get material and, consequently, much more expensive. That must be considered.

Mr. SLEMP. Where are these 34 expensive towers generally to be located?

Capt. GARLINGTON. Three of them at Portland, two of them in southern New York, one in eastern New York, one at the Delaware, two at Chesapeake, Cape Fear five, Charleston five, Savannah three, Key West one, Pensacola five, Mobile four, and Galveston two.

Gen. COE. If I may say something there, it is this: The location of searchlights on the coast south of Chesapeake Bay is most difficult, because there are no elevations as a general rule. Where we must use the lights it is impossible to use them unless they have a height

of 30 feet, and 40 feet is very desirable, greater heights being more desirable, but 30 feet is the minimum. Therefore what to do on that southern coast line is a serious problem. The armament is completely useless at night unless the searchlights are there. We have been studying that searchlight problem for many years, and we know where we can use lights effectively, but the thing which troubles me very much is the expense of installing them on that kind of a mount, and yet it is the only way we can put those lights there, as far as we can see at present. However, if the development which the Engineers are now carrying on—and which, as Col. Sherrill just stated, will soon be a question of fact—is as satisfactory as we hope, it may be possible to use these lights at a much less expense than the cost of installation of these towers.

Col. SHERRILL. The tractor lights are quite expensive, because they contain power and everything, but they are much more useful, because they are mobile; and if you do not get results at one place, you can use them at another place.

Mr. SLEMP. Referring to these 34 disappearing steel-tower lights, have you any searchlights of any character at these stations where you propose to put the 34 searchlights?

Gen. COE. At all of those stations they have at least one light. I think I am correct in that.

Col. SHERRILL. Yes, sir; that is correct. This project, as I have said, dates back to the Davis Board project.

Mr. SLEMP. How many years back?

Col. SHERRILL. Four or five years. These projects have been taken in hand in the course of years and have been revised on the basis of our experience with the coast defenses.

Mr. SLEMP. I do not understand that you have done any work on the installation of these 34 disappearing steel towers.

Col. SHERRILL. No, sir; we have not begun on them.

Mr. SLEMP. What is your next item?

TRACTOR MOUNTS, TELESCOPIC TOWER TYPE.

Col. SHERRILL. The next item is 25 tractor mounts complete of the telescopic tower type, \$1,625,000. The present project requires the installation of 61 of these mounts at seacoast defenses of the United States at a unit cost of \$65,000. We have asked for 25 out of a total of 61, which are estimated to complete the searchlight requirements for the coast defenses. In other words, we are asking for 25 out of 61. That is a new proposition.

Mr. SLEMP. Have you built any of those tractor mounts?

Col. SHERRILL. We have two mounts very nearly completed of this tractor type. They will be, we believe, the most efficient type that has yet been devised, including not only the light, which is the highest-powered searchlight known to the world, but it also involves the highest development of mobile appliances for carrying searchlights, both in the field and at seacoast batteries, because they would be equally useful for both purposes. This tractor light will go anywhere on any kind of ground. The reason it is more expensive is because it is more powerful than any tractor yet developed, even for heavy guns. In fact, our ordnance and artillery people have examined this tractor with a view to adopting some-

thing along this line for the intermediate guns. It is a very powerful tractor, and, as I have said, it can be used on almost any kind of ground. It is not simply a truck, but a tractor. In other words, it is of the caterpillar type. The tower itself is a very ingenious device, with a telescoping arrangement for carrying the light up with it.

Mr. SLEMP. Not having had one completed, and not having had one tested out, how can you ask for this large amount of money for that purpose until you have tested the tractor out?

Col. SHERRILL. This has been tested frequently in the course of its development and construction, but we have had no service test.

Mr. SLEMP. Is it not a little hasty to ask \$1,625,000 for construction until you have had a service test?

Col. SHERRILL. No, sir; this is the next step in the development of it.

Mr. SLEMP. Would you do that without testing it?

Col. SHERRILL. Of course, this money will not be expended unless the tests show that they come absolutely up to the requirements. This is the next step in the development. We make development contracts, and following that we go into it upon the production basis.

Mr. SLEMP. Would it not be more logical to come for this money after the tests have been made? You could then say, "We have tested this out, and it has met the requirements; we may want to make a little change here and there, but we are satisfied with it." Then you could ask for the money.

Gen. COE. So far as the test of that matter is concerned, we are in a position to proceed with the manufacture for this reason: We have told the engineers what we required, covering certain characteristics, including size, weight, etc., and all of those things have been agreed upon, and have been provided for in the model or pilot under manufacture.

Mr. SLEMP. You hope that will be satisfactory?

Gen. COE. The engineers have solved the engineering problems. When it comes out they will turn it over to us, and we may suggest some minor modifications. For instance, we might say, "This handle might be more conveniently located on the other side," but the essential engineering difficulties, I think, have been overcome.

Col. SHERRILL. Yes, sir; I feel that they have been. I do not want to leave the impression, however, that this is an absolute and unqualified success until we actually get it out and make a trial of it. It is important to have these lights in order to complete the project, and when that light has been tested, I would like to go ahead with it. We know that the tractor is a success. We have all the requirements worked out in accordance with the wishes of the Coast Artillery, and it is only a question of whether it functions correctly with the elevated tower when it is built. We have no reason to doubt but what it will, but we do not want to say that it will be an unqualified success until we have given it the service test.

Mr. EAGAN. When do you hope to make the service test?

Col. SHERRILL. Not later than the 1st of May. Then, if we did not have this money, we would be tied up for perhaps 14 months. If it is not a success, there will not be anything expended on it. It would seem unfortunate to stop at that particular point and wait for 14 or 15 months before we could do this work. This is more in the

nature of a reappropriation, and we feel that that ought to be weighed a little bit.

Mr. EAGAN. Have you developed your plan as to where these lights are to be used?

Col. SHERRILL. We have a statement in that table showing where they are to be used.

Mr. SLEMP. As I understand it, you can use these lights anywhere?

Col. SHERRILL. Yes, sir; we have figured out the places at which to use them, but they can be used wherever it is desired.

Mr. SLEMP. I suppose you would have some in reserve?

Col. SHERRILL. This does not contemplate a reserve.

Gen. COE. There should be searchlights in reserve, of course. These are so mobile that those on the Atlantic coast might serve as a reserve for the Pacific coast.

MOBILE FIELD SEARCHLIGHTS.

Mr. SLEMP. Did you not develop a mobile field-service searchlight in the operations over in France?

Col. SHERRILL. Yes, sir; we have a very excellent mobile field searchlight, which is entirely different from any in the coast defenses.

Mr. SLEMP. In what way do you get mobility in connection with them?

Col. SHERRILL. We have them mounted on Cadillac trucks, and the light is on the truck with the power plant. The personnel is carried on the truck.

Mr. SLEMP. Why can not they be used for this purpose?

Col. SHERRILL. The reason is that we must have a tower for the coast-defense work. That is necessary for the reasons brought out by Gen. Coe. You must have a certain minimum elevation in order to penetrate the atmosphere to be sure that you reach out to the distance where ships may come under fire. There is nothing for the amount of money involved that gives greater assistance to the fire of guns and searchlights. You are absolutely helpless and blindfolded if you do not have them.

There is one point I would like to emphasize: Awhile ago you made the statement that in this item we were starting out on entirely new work, but that is not the case. We are now working on this development. The item we have not started on, except in the development of it, is item No. 16 for the tractor mounts, but we are working under item No. 15. We are doing as much as we can under that from funds we have on hand, and will do so up to the end of the year.

Mr. SLEMP. Where is this tractor mount being built?

Col. SHERRILL. One is being built at Pittsburgh and the other in the neighborhood of Hoboken, or, I think, in Hoboken.

Mr. SLEMP. Are the Government plants doing the work?

Col. SHERRILL. No, sir; it is being done by contract. We have a very fine type of tractor.

Mr. SLEMP. Is it better than the Christie tractor?

Col. SHERRILL. It was stated a few days ago to the officer in charge of the work by a number of officers who examined it, that it com

pared very favorably with the best tractors they have. They are rather disposed to adopt it, with certain modifications, for intermediate-caliber guns.

Mr. SLEMP. I suppose we will have to pay a very large sum for royalty rights?

Col. SHERRILL. No, sir: the contract we make with them gives us all the rights for the use of the Government. That is to say, we make a development contract, and we do not let them develop it at the expense of the Government and then charge us royalties for using their ideas, because it is developed along our lines, or Government lines, and the Government controls the patents, if any, except as they may be used for outside purposes. They can use them as against outsiders, but not as against the United States.

CONSTRUCTION OF SEA WALLS AND EMBANKMENTS AT FORTIFICATIONS IN THE UNITED STATES.

Mr. SLEMP. The next item is for the construction of sea walls and embankments, \$547,000. I believe that amount has been reduced?

Col. SHERRILL. That estimate covers several items. All of them are more or less desirable, but in view of the necessity of keeping these appropriations down we have not put them in the essential class, but simply in the desirable class, so that the committee may take such action as it deems necessary. The conditions have not changed at all on which these estimates were based; that is, all these sea-wall items will have to be cared for eventually. But we have put the matter in such shape that the committee may omit it if they wish to do so.

Mr. SLEMP. Have you any unexpended balance?

Col. SHERRILL. We had an unexpended balance on December 31, 1919, of \$18,003.90, and it is estimated that there will lapse at the end of the year \$7,785.67, so that there will be spent between December 31, 1919, and the end of the fiscal year \$10,218.23.

Mr. SLEMP. At what points?

DETAILS OF ESTIMATES.

Col. SHERRILL. The items that are expended are at Fort Hamilton, Fort Mott, Fort Monroe, and San Francisco, Fort Scott. The items we have been working on are: Portland, Me.; Boston; New York, at Forts Hancock, Hamilton, and Schuyler; Philadelphia, Fort Mott; Norfolk, Fort Monroe; Baltimore, Fort Howard; Jacksonville, Fort De Soto; New Orleans, Fort St. Phillip; and San Francisco, Fort Scott. I have a list of the items—a very brief one—contemplated out of this fund. The largest item is Savannah, Ga. The work covered by this estimate consists of the construction of a breakwater parallel to the shore with a connecting dike, and is required to prevent further erosion of the shore at Fort Screven. The estimated cost, based on handling, towing, and placing 117,000 tons of stone, at \$4.50 per ton, is \$526,500. That work is necessary in order to protect that reservation and a certain number of buildings on the reservation, but is not essential, because, at relatively small cost, the buildings that are there can be either protected locally or removed. The reservation, though, is being washed away, and a great many demands have

been made by the local authorities for its protection. That is the largest item in this estimate.

Mr. SLEMP. What did you say that amounted to?

Col. SHERRILL. \$526,500. It can be omitted without very great detriment for this year. The next item is Portland, Me., a small amount of sea-wall repair to prevent the destruction of the stone wharf at Fort McKinley. Some of the fill forming a part of this wharf has already been removed by the action of the sea. The estimated cost of this work is \$800. That is desirable, but not absolutely essential. Delaware River, extension of the Fort Mott sea wall, \$9,000. This work consists in the construction of an extension to the existing sea wall at Fort Mott to the high bank on the shore of the river. The construction of 150 feet of sea wall, at \$60 per linear foot, is involved. This work is required to prevent the recurrence of damage to the existing wall which occurred during the current fiscal year, and the expenditure involved is \$4,250.

The next item is emergency work, \$10,700. This item is included to provide for such emergency repair work as may be required during the fiscal year. It frequently happens that as a result of severe storms portions of embankments are washed away or sections of sea walls undermined. The immediate repair of such damage generally results in preventing further damage and the expenditure of large sums for shore protection. I would rather suggest that that whole item, if necessary, be omitted and that the item we have for contingencies, which is \$100,000, be authorized, because we frequently have a great many items that can not be covered in any other way, particularly these items of damage by storms. We had a number that were paid out of the contingencies of the Chief of Coast Artillery, but he will have no such item in the future. So I should think, rather than have an emergency fund here, we might just as well let that whole item go out for this year, and that would mean a saving of \$547,000.

Mr. SLEMP. We will go to the next item in the bill.

REPAIR AND RESTORATION OF DEFENSES OF GALVESTON, TEX.

Col. SHERRILL. The next item is for the repair and restoration of sea walls, retaining walls, and fill, and for urgent repairs to batteries in the defenses of Galveston, Tex., \$10,000.

Mr. SLEMP. Would you be willing to include that in your contingent expenses?

Col. SHERRILL. Yes, sir; we can take care of that out of contingent expenses. Capt. Garlington brings up the point, however, that the usual idea about a contingent fund is that you can only use it for unforeseen things that have not been appropriated for. Unfortunately, this has been appropriated for, and that might prevent us from legally using the contingent fund for this purpose. So I would like to have that included and we can deduct it from the amount of the next estimate.

Mr. SLEMP. Does that entirely complete the sea wall at Galveston?

Col. SHERRILL. Yes, sir. This amount is submitted in order to provide for the completion of work during the fiscal year 1921. Funds heretofore appropriated are sufficient for the completion of work, but

on account of the fact that available funds will lapse June 30, 1920, the additional amount will be required.

Mr. SLEMP. How much have you on hand?

Col. SHERRILL. We had on hand the 31st of December, 1919, \$35,983.70, and we estimated that that would be expended before the end of the fiscal year. However, it is very uncertain how much we will use, but anything we do not spend will be turned back. Since that date considerable damage has been caused by another storm, that of September 13-14, 1919, part of which damages were repaired by an allotment of \$39,080 from the appropriation, "Contingent expenses, seacoast fortifications," act of June 15, 1917. This allotment was for the purpose of repairing damages to the elements of the defenses ordinarily constructed by the engineer department. In addition to the damages to these elements the buildings, roads, grounds, etc., were badly wrecked. The full details of these damages and the cost of replacement are now being considered by legal authority, and the funds required for this purpose will have to be taken up in future estimates. That storm damage was taken care of by that contingent fund.

Mr. SLEMP. This has relation to the wall for the protection of the Government's batteries there?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. It is not a civilian proposition?

Col. SHERRILL. No, sir; this protects Fort Travis and Fort Crockett and Fort San Jacinto. This small item is necessary to complete the work.

CONTINGENT EXPENSES, SEACOAST FORTIFICATIONS, UNITED STATES.

Mr. SLEMP. Your next item is:

For contingent expenses incident to the construction of seacoast fortifications and accessories, under the Engineer Department, \$100,000.

You must have quite a lot of money on hand for that purpose, have you not?

Col. SHERRILL. No, sir; the original fund has been under the Chief of Coast Artillery, and I do not know what is the state of the balance.

Gen. COE. There was a Treasury balance on March 5 of \$108,504.88, there was an unobligated balance on hand of \$95,481.45, making a total of \$276,985.32. There have been some further allotments from those funds, and the probable amount to be turned in will be something less than \$50,000.

Mr. SLEMP. Would not \$50,000 be about a sufficient amount for the contingent expenses?

Col. SHERRILL. That is a very uncertain item. It takes care of storm damage, for one thing.

NATURE OF EXPENDITURES.

Gen. COE. It might be of assistance to you if I would give briefly the items of expenditure for 1919, or the calendar year 1919. I have a list of them here, as follows:

Emergency fire-control stations at Manila, \$12,700; railroad artillery material for test for coast-defense purposes, Fort Story, \$11,000; Battery Newton, Panama, to cover cost of constructing new fire-control stations, \$16,900; Narragansett Bay,

telephone line to motor batteries, Fort Adams, \$1,340.79; Oahu, construction of datum joints for batteries at Fort Kamehameha, \$1,000; at Panama, repairing steps at Flamenco, \$6,000; at Galveston, repairing damage caused by storm, \$39,080; Long Island Sound, dismantling Battery North, Port Michie, \$1,200; at Chesapeake Bay, railroad track material, Fort Story, \$1,991.95; and Key West, repairing damage caused by storm, \$5,000.

Those were the expenditures in 1919. A good many of those expenditures were on account of emergencies and others were for the continuation of work for which no specific appropriation had been made.

Mr. SLEMP. There is no duplication as between the Coast Artillery and Engineers?

Col. SHERRILL. No, sir.

Gen. COE. Some of these allotments were made to the Engineer Corps, some to the Ordnance Department, some to the Signal Corps, and some to the Quartermaster Corps.

Mr. SLEMP. It is correct that you will have \$50,000 to turn back on the 1st of July?

Gen. COE. I estimated that \$50,000 will be turned back; yes, sir.

Mr. SLEMP. You wish \$40,000 more?

Col. SHERRILL. Yes, sir; a total of \$90,000, if you give us \$10,000 for the Galveston sea wall, which I think we can take care of out of that. If you give us the \$90,000 here, I think it will be sufficient. It is a rough estimate. It covers unexpected situations that arise.

Mr. SLEMP. Do you think that you could do something down at Savannah with some of this money by extending those groins?

Col. SHERRILL. I do not think we could, unless you have them extended for a considerable distance along the shore. I believe the investigation that has been made indicates that the sea wall is the best type of construction. We came to the same conclusion at Sandy Hook.

Mr. SLEMP. At Sandy Hook you did not go out into the water?

Col. SHERRILL. The only reason it does not go out into the water is because you can build it from a railroad track on the shore. The reason it goes out on the water is to simplify the building, because you can bring the material in on barges.

CONSTRUCTION OF FIRE-CONTROL STATIONS AND ACCESSORIES AT FORTIFICATIONS IN THE UNITED STATES.

Mr. SLEMP. Your next item is for the construction of fire-control stations and accessories, including purchase of land and rights of way, etc. You have reduced your estimate from \$3,134,890 to \$1,698,508. Give us a statement of your balances.

Col. SHERRILL. On December 31, 1919, there remained on hand \$480,829.96, and it is estimated that that will be entirely expended by the end of the fiscal year. That is the Engineer's amount.

Capt. RUHLEN. The balance on hand July 1, 1919, out of the two appropriations, "fire control," no year, and "fire control, deficiency act of June 15, 1917," have been carried separately and I have the amounts separately. The no-year appropriation balance on July 1, 1919, was \$17,702.68; the Treasury balance on March 1, 1920, was \$2,572.68; the unexpended balance in the hands of the Chief of Engineers, the Chief Signal Officer, and the Chief of Ordnance was

\$119,740.38, making a total of \$122,313.06. The appropriation under the deficiency act of June 15, 1917: The balance on hand July 1, 1919, was \$1,686,373.04; the Treasury balance on March 1, 1920, was \$986,373.04; the unexpended balance in the hands of the Chief of Engineers, the Chief Signal Officer, and the Chief of Ordnance was \$1,150,844.35, making a total of \$2,137,217.39. The appropriation for "fire control at fortifications, deficiency act of June 15, 1917," was made in a lump sum for the United States, the insular possessions, and the Panama Canal, and the balances I have given include those three localities.

Mr. SLEMP. Was that the unallotted balance that you gave as of June 30, 1920, amounting to \$2,137,217.39?

Capt. RUHLEN. That is the balance as of March 1, 1920, including both the Treasury balance and the unexpended balance. Some of the balances in the hands of the various chiefs of the services have been allotted and some allotments have been obligated. The exact details of that I have not been able to secure.

Mr. SLEMP. Assuming that you are carrying this work on up to and including June 30, 1920, how much unallotted balance will you have at that time?

Capt. RUHLEN. At the time the estimates for 1920 were submitted, fire-control projects were under way in various stages of completion in practically all the coast defenses. It was estimated that the unobligated balance for continental United States was about \$1,884,890. It was considered that if the projects then under way could be completed the existing batteries, including the 12-inch long-range batteries under construction, would be provided with efficient fire-control systems. It was thought that it would be impossible to obligate this entire amount to July 1, 1920, and, in view of the fact that it was impossible to determine what the unobligated balance would be at July 1, 1920, estimates were submitted covering the unobligated balance above mentioned of \$1,884,890.

Gen. COE. On account of the fact that this work is in the hands of three different agencies, it is practically impossible to give a reasonably correct estimate as to what will be the unobligated Treasury balance next June. It is further complicated by the fact that whether the work is going on or not depends upon so many different considerations. As it is spread all over the country, strikes and labor troubles of all sorts may defer it, and that makes it uncertain as to what the situation will be.

Mr. SLEMP. I wish to call your attention to the hearings of 1919 on this matter. Col. Hase made the following statement to the committee, in asking authority to retain the balance then on hand unallotted:

If we are allowed to retain that money I am certain that we would never again come to the committee and ask for funds for fire-control stations or equipment for any of the batteries we have now because we have money enough to complete the work, provided no radical changes are made in the fundamental principles which now govern these installations.

DETAILS OF ESTIMATE.

Gen. COE. No radical changes have been made in the coast installations; but I will say this to the committee, that I believe if the committee will reappropriate that amount, and that is practically

what we are asking for in the estimates, we can still carry out the proposition as made by Col. Hase in 1919.

Mr. SLEMP. This estimate of \$1,698,508 is about what your balance would be that you would otherwise return to the Treasury?

Gen. COE. We do not know how much it would be; but, for the purpose of the argument, if it were possible to make this a continuing appropriation, I believe it would carry out the project and practically complete it. Of course, it is not to be overlooked that we have in this item certain new work for certain new batteries. This estimate also includes 25 per cent of the estimated cost of the fire control to provide new batteries that are asked for, including the 16-inch rifles and the 16-inch howitzers that we had under discussion yesterday.

Mr. SLEMP. You are asking, then, for fire-control installations for thirteen 12-inch guns and twelve 16-inch howitzers?

Gen. COE. Yes, sir; 25 batteries.

Mr. BYRNS. Will it be necessary to purchase land for them?

Gen. COE. For some of the stations; yes, sir. That includes the cost of the small parcels of land we will need to get for the stations.

Mr. BYRNS. I was wondering whether at the beginning of the fiscal year all of these fire-control stations were in course of construction, or whether it was necessary to carry a further provision for the purchase of additional land.

Gen. COE. That is all under the batteries.

Col. SHERRILL. I have a list of the sites that we will require. If is not a large amount.

Mr. SLEMP. Are these batteries equipped with temporary fire-control installations that you are specifying all along the coast?

Col. SHERRILL. We are completing what is called the standard fire-control project.

Mr. SLEMP. Is it necessary to go on with the work at those different stations? I was at Fort Moultrie the other day, and I saw concrete fire-control station buildings being erected there, and the armament was not such as would make you feel safe. You had temporary fire-control stations already there, and I was wondering why you should go to a lot of expense for concrete buildings when you already have temporary fire-control stations. I do not know to what extent that is going on elsewhere.

Gen. COE. Not to any great extent. I do not know about the particular building going on at Fort Moultrie that you have mentioned, and I do not hesitate to say that probably certain economies might have been practiced in some of those cases, but I do not think that it would amount to a very large sum, even considering the total amount involved, but the main cost of the permanent installation consists in putting in the permanent cable and the ducts underground, instead of having it as we frequently do in some places—a telephone line for target practice. Of course, it is possible to fire the batteries with provisional or temporary installations, but, in order to obtain the full value of our permanent defenses, which I do not regard as excessive, we ought to have completed the fire-control projects that we have been working toward for many years. If I find that we are wasting money anywhere in this project, I will say that I will have it cut out at once. I do not think we are throwing away money in carrying on this work.

USE OF RADIO EQUIPMENT.

Mr. SLEMP. Have you given any thought to abolishing the telephones, or the wire telephone lines, and resorting to wireless or radio communication?

Gen. COE. We would not expect to use radio communication in general for such installations as we are now putting in, as these are comparatively short base lines, and they are only for the control of the batteries such as we referred to yesterday, covering a range of only 12,000 yards. Now, when we get the longer-range batteries we will have to get longer base lines. In Panama, for example, the cable element down there in some of our installations amounted to hundreds of thousands of dollars. I was very much put to it when I first took up the study of that particular problem as to what we would do, because it seemed that if we came to Congress and asked for such a large sum we could not reasonably expect to get it. Just how the problem would be solved we did not know. That led us to test radio phones, and we have had considerable success with them. However, it would be difficult to apply radio phones to shorter base lines, and it would probably be more expensive. Such an installation would probably result in considerable confusion. However, for long-range batteries, like those at Panama, covering from 14,000 to 20,000 yards, requiring long base lines, we hope to utilize radio telephones successfully. We have had success with them, or partial success with them. Of course, they are in a constant state of improvement at this time.

Mr. SLEMP. Are these 16-inch gunfire-control installations based on radio telephones or the other kind?

Gen. COE. This is only a preliminary and very rough estimate for going ahead with that work, step by step, with the beginning of the construction of the batteries.

Mr. SLEMP. If batteries for all of the 16-inch guns and howitzers were not allowed this estimate could be reduced to that extent?

Gen. COE. It might be materially reduced over our estimate, but that was only a very rough estimate. It was about 25 per cent of what we roughly estimated would be the total probable cost of the fire control in those batteries, and the final estimates in those cases would not come before you for two or three years.

Mr. SLEMP. Is the fire control for all the 12-inch guns and mortars completed?

Gen. COE. That is covered by the present estimate of \$1,698,508; but what I referred to before was what we were estimating as the unobligated balance at the present time, \$1,884,890. That is the sum you and I were speaking of a while ago.

Mr. SLEMP. If you had a reappropriation you would practically need no new money?

Gen. COE. Yes, sir; we need all of that money, and that is practically what we do need.

Mr. SLEMP. I mean, you do not need any additional money if there be a reappropriation?

SUBAQUEOUS SOUND AND FLASH RANGING APPARATUS.

Mr. SLEMP. Have you anything to say about the development of subaqueous sound and flash ranging apparatus, including their developments. How much do you need for that purpose and explain the meaning of the language?

Gen. COE. We have roughly estimated in our minds \$10,000 for that work. The flash and sound ranging apparatus is, of course, a tested thing and was used continuously during the war, at least in the latter part of the war. It is doubtful whether it has much application in seacoast defense work, although we are trying to see whether we can utilize it or not. The subaqueous range finding seems to present more possibilities in the way of future development than any other line of thought, but whether it is going to be successful I can not possibly undertake to predict at this time. Of course, you have a serious problem when you have to fire at a vessel which is over the horizon from the ordinary height that you find along the seacoast.

Mr. SLEMP. You are going to endeavor to determine its location by what you discover under the water?

Gen. COE. Yes, sir. We have had some experiments along that line which are very promising. Of course, any vessel, whether it is moving or not—that is, it may be at anchor—has a great deal of machinery in it which is always moving, or some of it, and there are very many vibrations which it gives off, and it is possible that by utilizing microphones, which are located under water, we may be able to locate a vessel whether it is at anchor or moving.

Mr. SLEMP. Even at some distance?

Gen. COE. The distance will depend upon where we put our microphone; we will have to put it some distance in advance, undoubtedly. I will read the following which appeared in *Engineering*, a London publication, published during 1919:

In the war, during the bombardment of the Belgian coast, it was a common thing for a monitor to proceed in a fog to a position some miles from the coast and by dropping depth charges have its position accurately determined from stations on the coast of England. So accurately was this done that it was found, when the monitor's guns were trained in selected directions, that objectives several miles inland could be hit with regularity and with a minimum expenditure of ammunition.

Mr. SLEMP. Is there any conflict between your department and the Navy Department in regard to this development?

Gen. COE. There was a considerable overlapping, I think, during the war, but since the armistice the Navy Department has relinquished all work and turned it over to the Coast Artillery, and has also turned over to us considerable apparatus which they purchased during the war. I am referring to subaqueous ranging and not flash-sound ranging.

Mr. SLEMP. The sound and flash ranging are different from the subaqueous ranging?

Gen. COE. Yes; they are entirely different. That work was handled by the engineers during the war and was one of the most interesting things that was accomplished during the war, I think. It is in a highly developed state, and we have two tractor regiments equipped with sound-ranging apparatus. I think there is not so much work to

be done there, but probably improvements will be necessary in that field.

Mr. SLEMP. Are you using that in connection with your fire-control work?

Gen. COE. I think it would be very difficult. This depth-charge business, of course, which I just read, was a part of the sound ranging.

Col. SHERRILL. Until recently the Chief of Engineers has been considering the development of the subaqueous range finding, but it was discovered that the Chief of Coast Artillery could use his commissioned and enlisted personnel as well as his tugs, which were applied normally to other purposes; for instance, in mine planting, etc., and by doing that a great deal of money could be saved. So the development of that has been turned over to the Chief of Coast Artillery, the Chief of Engineers giving him assistance and buying such material as is necessary, and the Chief of Coast Artillery is going ahead with that. During the war the Navy, with the assistance of the coast-defense stations at several places along the coast, did a great deal of development work along that line, but their development work was intended for a little different purpose. It was intended to indicate the approach of a submarine rather than to give the definite location, and therefore they did not go quite as far as the Coast Artillery wants to go.

The Coast Artillery, of course, desires not only the indication of the approach of a vessel, whether it is a submarine, cruiser, or battleship, but wants also to be able to plot on shore the track of that vessel and that was, incidentally, partly solved by the Navy and the Coast Artillery during the war. The indications are that by running out cables for considerable distances in front of our fortifications as, for instance, at Sandy Hook—say, we run out a cable for 15,000 yards, placing these microphones at various places on that cable; they will be able to pick up the ships that come within the range, say, of 25,000 yards of the fort, and not only pick them up but keep track of those vessels, and if a vessel is standing still we will be able to keep it located, as Gen. Coe says, by the vibrations within the ship. That is a great advantage over any known system of fire control in that it is absolutely independent of weather, fog, reasonable storm, the distance over the horizon, or anything else. They have developed it to the extent that they can pick out a number of vessels, the characteristic vibrations of some one particular vessel by a selective listening device or adjusting device. So the prospect of successful range finding by that method is quite good, I think. They are working on it now under the Chief of Coast Artillery, with the assistance of the Chief of Engineers as to material and some technical help.

Gen. COE. We have consolidated that work with the development work with which you are well acquainted, connected with the Hammond torpedo control. While they are not directly related they are related in a general way, so that it makes it advisable to combine them.

The fire control at some of the 12-inch batteries is under way but some of those have not been started, and none of the fire control for the proposed 16-inch batteries has been started.

Mr. SLEMP. What about the 12-inch mortars?

Col. SHERRILL. We have no 12-inch mortars in the new projects under way, but all of the fire control for the older armament—which, if there was any question at all, would be the ones to be considered—is in a varying condition of completion, some of it being 98 per cent completed.

Gen. COE. I want to say that if I felt the defenses were valueless I certainly would not recommend the putting of another cent of money in them, but I think their function is an important one when you consider it is that of denying the possibility of an enemy occupying all of our ports from Galveston to Cape Fear, and the defenses will successfully accomplish that purpose provided they are given this comparatively trifling appropriation—trifling when you consider what has been spent in putting them in. This small amount is necessary in order to enable them to operate effectively, but whether it is necessary to go on with this work now is a matter for the committee to decide.

Col. SHERRILL. I would like to say that one of the projects, Fort Flagler, is 90 per cent completed; that involves not only the fire-control but the switchboard room, so that the whole thing is virtually completed, needing but little money to finish it.

INSTRUMENTS AND MACHINERY.

Mr. BYRNS. You have in this item an estimate for the purchase, manufacture, and test of range finders and other instruments for fire control at the fortifications, and the machinery necessary for the manufacture at the arsenals. I do not know just what that refers to. Is it necessary to purchase additional range finders?

Gen. COE. That has reference to certain instruments which are well standardized; for example, telescopic range finders.

Mr. BYRNS. The reason I ask that question is that I presumed the Government had about all the instruments of that kind that were necessary for some time to come.

Gen. COE. Well, I think you are right, too, Mr. Byrns, in that. I can not give you the figures exactly, but I believe I am safe in saying that 80 per cent of this appropriation is for engineering work. No large amounts are going to be spent for those things, as you correctly surmise, because we have an abundance of certain of those items. If there are any deficiencies, it is because there was no demand for that particular item during the war. For example, one of the things that there was no use for during the war, and which we now have to get, would be a time-interval device, which is not a large item as far as cost is concerned, but it is a part of the fire-control system which we would install in our defenses.

Mr. BYRNS. At any rate, you do not anticipate the necessity of installing any considerable amount of machinery or anything of that sort?

Gen. COE. No, sir. This is the wording that has been in the bill for some time.

PURCHASE OF LAND.

Mr. BYRNS. Do you expect to purchase any lands?

Col. SHERRILL. Yes; a few sites, but only small areas.

Mr. BYRNS. What is the total amount of money to be used for the purchase of sites?

NOTE.—Estimated cost of sites for fire-control stations, \$180,000.

MAINTENANCE OF COAST ARTILLERY WAR INSTRUCTION MATÉRIEL AT
COAST ARTILLERY POSTS.

Mr. SLEMP. The next item in the bill is for maintenance of Coast Artillery war instruction matériel at Coast Artillery posts, including necessary material and labor therefor and for extra-duty pay to soldiers necessarily employed for periods of not less than 10 days, \$1,250.

Gen. COE. We have spent very little of that this year, and there is a balance of \$1,124.14.

Mr. EAGAN. That is, for 1919?

Gen. COE. Yes, sir.

Mr. EAGAN. You had nothing at all for 1920?

Gen. COE. No, sir. Under the last appropriation there was a balance of \$1,124.14.

Mr. EAGAN. For the fiscal year 1919?

Gen. COE. Yes, sir.

Mr. SLEMP. Would it not simplify things to leave that out entirely?

Gen. COE. It is a matter of very little importance.

Mr. SLEMP. As a matter of simplification that ought not to be carried under this head?

Gen. COE. It is at times of great convenience to have a fund from which we can buy things which we distribute to all the coast defenses for general instruction, but I have no doubt we can always apply the school funds to that. It is a trifling matter, but I would prefer to have it left in.

ENGINEER DEPARTMENT.

FORTIFICATIONS IN INSULAR POSSESSIONS.

PROTECTION, PRESERVATION, AND REPAIR OF FORTIFICATIONS—HAWAIIAN
ISLANDS.

Col. SHERRILL. The next item is on page 59, under the head of fortifications in insular possessions, "For protection, preservation, and repair of fortifications, including structures for torpedo defense, for which there may be no special appropriation available, and for maintaining channels for access to torpedo wharves at the following localities," the first being the Hawaiian Islands.

Mr. SLEMP. Please state your balances.

Col. SHERRILL. The balance unexpended on December 31, 1919, Hawaiian Islands, was \$9,834.66, which will be expended by the end of the fiscal year.

Mr. SLEMP. You are going to spend that for the usual purposes?

Col. SHERRILL. Just the usual purposes of preservation and repair. I have a statement of the work proposed which I can give you.

Mr. SLEMP. You are asking for a little more money next year.

Col. SHERRILL. We are asking for \$15,000, and I have a statement showing the reason for that.

Mr. SLEMP. You will observe that these appropriations have been gradually growing?

Col. SHERRILL. Yes; and that is a very natural condition for two causes: one is the rapid increase of both labor and materials and the other is the almost entire completion of the work in the Philip-

piners and the tendency to completion in the Hawaiian Islands. In other words, the further along we get the more maintenance we require and the more the other appropriations drop. For instance, in the Philippine Islands this year we ask for very little in the way of new funds.

Mr. BYRNS. Have you been handicapped by the lack of appropriations for the Hawaiian Islands?

DETAILS OF ESTIMATE.

Col. SHERRILL. Yes, sir; and I can read you a statement which substantiates that very fact. The total cost of completed works, including land defense batteries, torpedo structures, and the 12-inch long-range battery at Ahua Point, the concrete work of which was completed on July 22, 1919, is \$2,629,475.80. It is estimated that it will require practically one-half of 1 per cent of that amount, or \$15,000, to properly keep in repair and maintain the different units of defense during the fiscal year 1921.

Some of the torpedo structures are wooden frame buildings covered on roof and sides with corrugated iron and are, and have been for the past two years, in need of repainting. The wooden fender system to the torpedo wharf, which is a concrete structure, is in need of repairs. Trees should be planted and cared for at Fort Kamehameha in the vicinity of No. 6 (60-inch) searchlight (this is a Scherzer rolling lift tower installation), the secondary observing stations and the 12-inch long-range gun emplacements at Ahua Point. The parapets of the different batteries are in need of minor repairs. The allotment for the fiscal year 1919, \$7,500, was exhausted in March, 1919, leaving several artillery requisitions partly unfilled which had to be completed from the allotment for the fiscal year 1920. Many of the batteries in this district are several years old and require minor repairs continually; these in the aggregate amount to a considerable sum. As the different units of defense increase in age, the amount of funds necessary for their upkeep also increases. The water in the islands is very destructive of metals, and latrine fixtures and water pipes need renewing frequently.

The allotments for preservation and repair in previous years have been barely sufficient to provide for major items to which the appropriation is applicable, and consequently many items of lesser importance have not received the attention they require. The result is that, in cases where work is postponed on account of lack of funds for its accomplishment, the cost when it is finally accomplished is much greater than would have been the case had it been possible to do the work when the need first became apparent.

Mr. BYRNS. You had a balance on December 31, 1919, of \$9,800. Would not that be sufficient for all the work that will be necessary during this fiscal year for protection, preservation, and repair?

Col. SHERRILL. No, sir; that will largely be used up this year; in fact, they estimate it will be used up.

Mr. BYRNS. I understand, but I am speaking now of your expenses year by year. For instance, you made an estimate last year of \$15,000 and Congress reduced it to \$12,500, and that appropriation carried. What I wish to know is whether that was not sufficient for all necessary purposes under this appropriation?

Col. SHERRILL. No, sir; I do not think it was; I think this statement is very conclusive that it was not. You will notice that I have said the allotment for the fiscal year 1919 was exhausted in March, 1919; that indicates they had used up all of their old balances and were getting right down into that fiscal year's sum.

Mr. BYRNS. Right on that point, I notice that your total expenditures for the year 1919 were \$8,332.59, which is a little over one-half of what is asked for next year?

Col. SHERRILL. I am quite sure that can not be the completed expenditure, but that may be the expenditure out of that current appropriation.

Mr. SLEMP. You had \$2,500 additional from the emergency fund, but even that would only bring it up to \$10,000.

Col. SHERRILL. As I say, I can not understand how that can give the total year's appropriation when the allotment for 1919—that is, last year—was entirely expended when three-fourths of that year was gone.

Mr. BYRNS. The appropriation for that year was \$7,500, and then there was this emergency allotment of \$2,500.

Col. SHERRILL. Well, the statement I have here shows that it was expended in March of that year.

Mr. BYRNS. You mean including the allotment?

Col. SHERRILL. No; not including the allotment.

Mr. SLEMP. You did not resort to the emergency fund this year for the Hawaiian Islands, did you?

Col. SHERRILL. No, sir. But as those fortifications become more nearly completed, and especially in the Tropics, they require more money to keep them up and really the amount of money involved, based on the expense of the structures, is very, very little. Here is nearly \$3,000,000 spent and we asked for \$15,000 to keep it up. It is almost a bagatelle.

PROTECTION, PRESERVATION, AND REPAIR OF FORTIFICATIONS—PHILIPPINE ISLANDS.

The next item is for the Philippine Islands. On December 31, 1919, there was an unexpended balance of \$6,528.04, and it is estimated that will be expended before the end of the fiscal year.

Mr. SLEMP. I do not see how you can get through the fiscal year with \$6,000.

DETAILS OF ESTIMATES.

Col. SHERRILL. It simply means they will have to turn down estimates that are put in for essential repairs. The district engineer in charge of defensive works, Manila, has submitted the following report, dated June 20, 1919, in connection with the need for funds for the maintenance of fortifications and torpedo structures in the Philippine Islands for the fiscal year 1921:

Maintenance of roads and trails, \$8,000.

There are quite extensive roads and trails used there for defensive purposes, which have to be cared for out of these funds, and the extremely heavy rainfall is the cause of that item.

Mr. SLEMP. That accounts for \$8,000.

Col. SHERRILL. Yes, sir.

Clearing tail of Corregidor Island, \$500.

That is necessary as a defensive measure so we will have a good field of fire in case attackers come across the tail of the island.

Inspection and care of materials for land defense, \$1,000.

They have on Corregidor a war reserve of defensive materials maintained because without those the defense would be absolutely worthless, and that item is for that purpose.

Maintenance of completed land defense work, \$3,000.

That includes a great many trenches for Infantry, and that land defense work is necessary in order to prevent an enemy from making a landing. It includes the structures that are built at various places on Corregidor Island for sheltering the local garrisons and various other structures that are needed with the land defenses.

Mr. SLEMP. You already have those shelters.

Col. SHERRILL. This is for the maintenance and upkeep of them.

Repainting engine rooms at batteries, \$2,500.

Repainting plotting rooms, \$800.

Concealment painting for defensive works, \$9,800.

Mr. SLEMP. Is that camouflage work?

Col. SHERRILL. Yes, sir; that is an item which I think can well be omitted and amounts to \$9,800. Although they do use that painting for protecting the material, it is listed here as concealment painting or camouflage painting, and we are making it a principle to not go into that in time of peace.

Maintenance and operation of floating plant, \$11,200.

Mr. SLEMP. What is that?

Col. SHERRILL. That means the barges and derricks and all the small items of plant used on those coast defenses there.

General repairs and supplies for Artillery, \$22,000.

This involves all of the materials that are issued to the Artillery for the use of the troops themselves with soldier labor in doing their work of upkeep around the batteries and emplacements. It includes power supplies for operating these plants and searchlights and replacements, and so on.

Mr. SLEMP. That item alone is larger than the appropriation you have ordinarily been having. In 1919 you had a total of \$20,000 and in 1918, \$15,000.

Col. SHERRILL. And in 1920, \$35,000. I will read you the reason for that just below here:

Maintenance of Manila and Fort Mills offices, \$15,000.

This makes a total of \$73,800.

Preservation of torpedo structures:

Repainting torpedo structures, \$3,000. That is for that mining project.

Maintenance of road to Malinta Cove, \$1,000.

General repairs and supplies for Artillery, \$5,000.

Maintenance of Manila and Fort Mills offices, \$3,000, a grand total of \$85,800.

In support of the above estimates the following statements may be made:

The estimates are for funds for the fiscal year 1921.

So far as information is now available construction work will be completed by 1921, and all costs of operating this engineer district will probably depend on preservation and repair fund.

An organization must be maintained to care for fortification matters. A very considerable percentage of the affairs requiring attention carry no field expenditures, yet require considerable technical attention. The war reserve supplies must be taken care of. For the reason just given provisions have been made to maintain a small force for this work.

Consideration must be given to the high cost of materials and supplies in this district and to the excessive deterioration constantly occurring in this climate. This requires much repainting and repairs.

Due to the nature of Corregidor Island, the maintenance of the land-defense roads and trails requires a great deal of attention. Due to the rapid growth of vegetation, it will be necessary to constantly clear the trail of the island.

Fort Drum was transferred—Fort Drum is on El Fraile Island, and it is entirely built of concrete and inclosed very much like a battleship—it was transferred on June 17, 1918. This fortification is a large and expensive work and adds to the estimated cost of maintenance heretofore submitted. Also Battery Craighill, with its fire-control station, is to be transferred very soon and will have to be maintained. The land-defense projects for Forts Frank and Hughes are now completed and will require maintenance. It is further understood that Fort Wint is also to be maintained.

It may be added that the funds allotted for the fiscal year 1919 were insufficient and have already been expended, and funds from the 1919–20 allotment are now being expended.

This report was dated June 20, 1919. It takes a long time to correspond with the Philippines and shows that even then we were working ahead on that year's fund.

Mr. SLEMP. You are not constructing any batteries there.

Col. SHERRILL. The fortifications of the Philippines are practically completed, and everything now is maintenance.

Mr. SLEMP. Is the Manila office the only office the War Department maintains over there?

Col. SHERRILL. Yes; and, of course, it will be the policy of the Chief of Engineers to cut that office down to the very minimum as soon as these items of new construction are out of the way. He would then probably have a little suboffice over at Corregidor and the main office would practically be abandoned in the absence of any further construction work there.

Mr. SLEMP. In the absence of any further construction work, why the necessity for these barges and floating plants?

Col. SHERRILL. They would be done away with, too, as soon as we finish the fire-control construction and the wharf and so on.

The CHAIRMAN. They would have no relation to fire-control construction?

Col. SHERRILL. Yes; we use those all the time in getting materials around. We can not do any work at all in a place like that without floating plant.

Mr. SLEMP. How near completed are your fortifications and your fire-control projects?

Col. SHERRILL. They are all very nearly completed.

Mr. SLEMP. Ninety-five or 97 per cent?

Col. SHERRILL. I would not be able to say offhand. We will take that up later when we get to fire control.

Mr. SLEMP. I will ask you to itemize the various items under this estimate of \$85,800 in the order of their importance.

Col. SHERRILL. Yes, sir; I can give you that in the order of importance.

STATEMENT OF ORDER OF IMPORTANCE OF ITEMS IN ESTIMATE FOR MAINTENANCE OF FORTIFICATIONS, PHILIPPINE ISLANDS.

Original estimate	\$85,800
Dropped from consideration at hearings, item for concealment painting	9,800
Remainder of estimate	<u>76,000</u>
1. General repairs and supplies for artillery:	
(a) Other than torpedo structures	22,000
(b) Torpedo structures	5,000
2. Manila and Fort Mills offices:	
(a) Prorated to other than torpedo structures	15,000
(b) Prorated to torpedo structures	3,000
3. Maintenance of completed land defense work	3,000
4. Inspection and care of materials for land defense	1,000
5. Maintenance of road to Malinta Cove	1,000
6. Maintenance and operation of floating plant	11,200
7. Maintenance of roads and trails (land defense)	8,000
8. Repainting torpedo structures	3,000
9. Clearing trail of Corregidor Island (land defense)	500
10. Repainting engine rooms at batteries	2,500
11. Repainting plotting rooms	800
	<u>76,000</u>

Mr. SLEMP. Of course, we have no way of knowing about the maintenance of roads and trails, \$13,500.

Col. SHERRILL. As I suggested, I have no objection to eliminating the item of \$9,800 for concealment painting, and I will insert the items listed in accordance with their importance.

PURCHASE AND INSTALLATION OF SEARCHLIGHTS FOR DEFENSES IN PHILIPPINE ISLANDS.

The CHAIRMAN. The next item is "For the purchase and installation of searchlights for the defenses of most important harbors in the Philippine Islands, \$2,000."

Col. SHERRILL. The estimate submitted covers certain additional work required to be done in connection with the installation of searchlight No. 1, 60-inch, at Fort Mills, including the extension of the track to operating position and minor items of work. In addition, it is possible that some of the work now in progress in connection with the modification of existing lights to take Sperry high-intensity mechanisms and the installation of two lights from Fort Wint at existing positions at Fort Hughes to replace the old type Sautter Harle lights, may remain unfinished at the end of the current fiscal year. It is estimated that the amount submitted for 1921 will be sufficient to cover all work, \$2,000.

Mr. SLEMP. Were the eighteen 60-inch searchlights Sperryized for which you had an appropriation last year?

Col. SHERRILL. The modifications have been sent out but have not been applied yet.

Mr. SLEMP. Did you give the amount of money you had on hand for that?

Col. SHERRILL. No; I did not. For the Philippine Islands, searchlights, available December 31, 1919, \$38,519.04; estimated expenditures, \$36,879.39; estimated to lapse at the end of the fiscal year, \$1,639.65, so that this is really in the nature of a reappropriation.

PURCHASE AND INSTALLATION OF SEARCHLIGHTS FOR DEFENSES IN HAWAIIAN ISLANDS.

The next item is the Hawaiian Islands searchlights, unallotted balance January 31, 1920, \$842.70. This appropriation will undoubtedly all be expended during the year.

Mr. SLEMP. You had \$53,000 a year ago, for 1919.

Col. SHERRILL. I have a detailed statement of what is being done with that right here.

Mr. SLEMP. This is what you stated a year ago:

Gen. WINSLOW. There is an unallotted balance of \$53,000 for the searchlights for the Hawaiian Islands, which is the cost of Sperryizing all we have over there and completing some of the elevated mounts.

Mr. BYRNS. Will all that be required to complete the work?

Gen. WINSLOW. Yes, sir.

Is this new estimate of \$50,000 for doing the same work?

Col. SHERRILL. Not entirely; no, sir.

Mr. SLEMP. That was the statement.

DETAILS OF ESTIMATE.

Col. SHERRILL. I will just read you the pages of our estimate:

Completion of searchlight project for the Hawaiian Islands. This project is complete except for lights Nos. 4, 7, and 8, and the furnishing of 60-inch portable lights for Nos. 5 and 9, which are only 36-inch lights. The installation of No. 4 is now in progress. Nos. 7 and 8 now temporarily mounted are, on account of low elevation of site, to be installed on towers which are now being manufactured.

I believe, Mr. Slemp, there has been some modification in the project to take care of difficulties in the previous condition of those lights.

Contract awarded to Bethlehem Steel Bridge Co. for delivery six months after execution of contract. The estimate submitted for 1921 is to cover the installation of those towers and shelters for lights, the provision of two Cadillac 60-inch portable lights for Nos. 5 and 9, and the completion of such of the work at No. 4 position as may remain unfinished.

Erection of towers and so forth at Nos. 7 and 8, \$25,000.

Cadillac portable, Nos. 5 and 9, \$20,500.

Completing No. 4 and other contingencies, \$4,500.

Total, \$50,000.

Gen. COE. I would like to say, Mr. Slemp, I do not think there has been any change for many years in the searchlight project for Hawaii, and Gen. Winslow's statement, if it is read as I believe he intended, means that it would take all of that balance and perhaps more

to complete the project. This present estimate, I believe, completes it, does it not?

Col. SHERRILL. This is intended to complete it.

The CHAIRMAN. You did not have any appropriation last year at all, but in the hearings you stated you had on hand \$53,000, and upon being asked what you were going to do with it you said that you were going to Sperryize the lights there.

Capt. GARLINGTON. And erect those two on towers; does he not bring that out?

Mr. SLEMP. No.

Capt. GARLINGTON. That has always been intended.

Mr. SLEMP. Did you state that you were going to install some of those disappearing-tower searchlights out there?

Col. SHERRILL. Yes; two of those disappearing searchlights are to be installed over there, and the installation of them is provided for in this estimate.

Mr. SLEMP. What is the cost of the two?

Col. SHERRILL. The erection of towers Nos. 7 and 8, for the two of them, \$25,000. That includes the building of the power houses and the various auxiliaries that go with it; half of it is for that purpose.

Mr. SLEMP. You do not propose any portable searchlights?

Col. SHERRILL. Two are proposed, two Cadillac portable searchlights.

Mr. EAGAN. I was wondering why you had an unallotted balance of \$53,000 last year, when you received no appropriation between 1914 and 1919 and only had \$33,000 for 1920.

Col. SHERRILL. There was very little work done in completing this project during those times.

Gen. COE. It was due in great part to the thing that Capt. Garlington spoke about, the difficulty of solving that problem down there. There were so many combinations that gave trouble. The surf, as he says, breaks there continuously; and as the mist rises up probably 30 or 40 feet at the place where the surf breaks, although it is a considerable distance in front of the searchlight, yet you must get high enough, as you get back, to see over that, or you are frequently cut off from view. That problem has been studied out there in a practical way for the last four years to my positive knowledge.

MAINTENANCE AND REPAIR OF SEARCHLIGHTS AND ELECTRIC LIGHTS AND POWER EQUIPMENT FOR SEACOAST FORTIFICATIONS, HAWAIIAN ISLANDS.

Mr. SLEMP. The next item is:

For maintenance and repair of searchlights and electric light and power equipment for seacoast fortifications and for tools, electrical and other supplies, and appliances to be used in their operation at the following localities:
Hawaiian Islands, \$7,000.

Col. SHERRILL. The balance available on December 31, 1919, was \$2,732.52. It is estimated that this will all be expended by the end of the fiscal year.

The estimates and appropriations for supplies, Hawaiian Islands, for the fiscal years 1918 to 1920, inclusive, have been in the sum of \$5,000. The estimate submitted for 1921 is \$7,000, an increase of \$2,000 over estimates and appropriations for the preceding year.

The equipment for which supplies are provided under this appropriation consist of 25 generating sets and two 5-kilowatt mining casemate sets, together with seven 60-inch, two 36-inch, and four 24-inch searchlights, the 24-inch lights being portable outfits. Funds appropriated heretofore have been insufficient for the procurement of ordinary supplies. During the fiscal year 1919 requisitions amounting in value to approximately \$1,000 were held up pending the availability of the 1920 appropriation. This deficit caused a reduction of \$1,000 in the amount of the 1920 appropriation available for supplies of that year. Taken into consideration in connection with the probability that a similar deficit will also occur during 1920, would indicate that requisitions to the value of approximately \$1,000 will have accumulated at the end of the fiscal year 1920 for which funds will not be available. The result will be that in addition to providing for supplies required for ordinary use during 1921, the appropriation for that year will have to bear the expense of providing the supplies called for by the requisitions accumulated during 1920. The appropriation of the increased amount estimated for that year is accordingly essential.

Mr. SLEMP. In getting supplies and tools and appliances for the Hawaiian Islands, have you made a careful search among your supplies here from the field and so on?

Col. SHERRILL. Yes, sir; the same condition applies. They have that all in hand.

Mr. SLEMP. We must have a great deal of this equipment.

Col. SHERRILL. You will notice here, Mr. Slemp, that there are a large number of these plants to be taken care of—25-kilowatt sets and so on, a very large number, and as I said before, our supply section has taken all these things that have come from France into consideration, and such as are available will be used. Previous to right now we could not count on using that equipment that was bought for the field in the seacoast defenses in the Hawaiian Islands because they were under entirely different appropriations and it was not proper to use over there materials bought for some other place unless reimbursement was made, but there is account taken of the supplies on hand.

Anything we have on hand that is available we use, but the main part of this is to keep the plants running and for current replacement, like injured mirrors or carbons, our actual running expenses of the plant.

MAINTENANCE AND REPAIR OF SEARCHLIGHTS AND ELECTRIC LIGHT AND POWER EQUIPMENT FOR SEACOAST FORTIFICATIONS, PHILIPPINE ISLANDS.

Mr. SLEMP. The next item is for the Philippine Islands, where you are estimating \$25,000.

Col. SHERRILL. The appropriation for 1920 was \$25,000, and the balance on hand on December 31, 1919, was \$13,874.69, which it is estimated will be expended by the end of the fiscal year. That is just about half of the amount to cover about half of the year.

Mr. SLEMP. When you appeared before the committee before, you stated that you needed more money out there, because during the

war you had to keep these lights running all night. That was the occasion for doubling the appropriation, first, from \$5,000 to \$10,000, and then from \$10,000 to \$25,000. That ought not to be a precedent for future appropriations.

Col. SHERRILL. No, sir; that would not be a precedent. We had to run the lights more during the war. They have a large number of plants to be operated and the upkeep of those plants in the tropics is greater than it is in the States.

Mr. SLEMP. For 1911, 1912, and 1913 you had an appropriation each year of \$2,500; for 1914, 1915, and 1916 you had an appropriation each year of \$3,000; for 1917 the appropriation was \$3,500; for 1918, \$5,000; for 1919, \$10,000; and for 1920, \$25,000.

DETAILS OF ESTIMATES.

Col. SHERRILL. The two main reasons for that increase are, first, the increase in the number of plants to be cared for. They have been constantly increased until now the Philippine Islands fortifications are practically complete.

Mr. SLEMP. How much have you increased them since 1911?

Col. SHERRILL. Fort Drum is practically equivalent to a large battleship, with all of its power plants, ice plants, and everything that goes to make up a garrison. All of that is paid for out of this fund rather than from the quartermaster fund.

Col. SHERRILL. At Fort Drum the plants are used to furnish light constantly. In other words, the garrison lives right in it.

Mr. SLEMP. How much money do you spend there?

Col. SHERRILL. On Corregidor Island we have a large garrison, and the power plant supplies all of the light. There are 2 battalions of Infantry, 2 companies of Engineers, and I think 12 or 14 companies of Coast Artillery. That is the latest information I had. This takes care of the lighting for all of it.

Mr. SLEMP. That is a new power plant?

Col. SHERRILL. That is the central power plant at Fort Drum.

Mr. SLEMP. That has not been completed very long?

Col. SHERRILL. I think it was turned over in 1918. As I stated, it deteriorates much more rapidly than would be the case were it installed under normal conditions. In other words, that is due to the effect of salt water and salt air. At the end of September, 1919, with only three months of the year elapsed, the appropriation for the current fiscal year had been expended, with the exception of \$11,667.03, leaving less than one-half of the original appropriation available for the expenses of three-fourths of the fiscal year remaining.

The CHAIRMAN. You do not mean to say that the maintenance of the power plant in the Philippine Islands will cost \$25,000 a year?

Col. SHERRILL. That covers all the various supplies and replacements.

The CHAIRMAN. As I recall it, last year, when Col. Winslow was before the committee, the statement was made that a great deal of the \$10,000 was expended in the first three months, and that they were going to take the rest from the war reserve. It was stated that they had only \$79 remaining in January, 1919. Now, the money had been

largely expended for supplies, which was thought necessary because of the distance from which the supplies would have to be shipped. I would suppose that with last year's appropriation, those supplies would be brought up pretty well to the high-water mark, and that you would commence to drop back to somewhere near your normal appropriation—not clear back, of course, because you have installed so much more electrical equipment that must be operated; but, evidently, you are not going permanently to require \$25,000 to maintain and repair the searchlights and electrical power equipment in the Philippine Islands.

Col. SHERRILL. If you take out the Fort Drum installation, which, as I said, involves practically the upkeep of that post, that might be so. Fort Drum has to have practically the same facilities that you have on a battleship. They must have their refrigerating system, ice plant, etc., and they must operate all the time. They would have to run all the time in order to give these people ventilation, even. If you could eliminate Fort Drum, you could materially reduce this expenditure. We may be able to cut it down after they bring the war reserve completely up to date.

The CHAIRMAN. You had for 1919 an appropriation of \$10,000, and then you used something out of the war reserve. You have an appropriation of \$25,000 for the current fiscal year. Can you tell the committee how much you used out of this appropriation, and how much you used out of the war reserve for the purchase of supplies, tools, electrical equipment, etc.?

Col. SHERRILL. I can give you a detailed statement showing how much was expended for supplies and how much for operation at each one of these localities.

The CHAIRMAN. I assume that a large part of it was used for that purpose.

Col. SHERRILL. Yes, sir; during the war they had to use up a great deal of equipment.

The CHAIRMAN. And you put more supplies in store, so that you could continue operations in case you were shut off for any military reason?

Col. SHERRILL. Yes, sir. Of course, we used a great deal more material in operating, because we operated almost constantly during the war. At Manila, as at Panama, they ran the lights almost constantly. They kept the places illuminated as a precaution, and, as I say, they did that at Panama also.

I will insert the statement you requested in the record:

On account of the fact that the power plant at Fort Drum, described in detail above, became a charge against the supplies appropriation for the first time during 1918, it developed that the funds available under that appropriation for the fiscal years 1919 and 1920 would be no more than sufficient to meet the current operating expenses, and it would not be practicable to divert any of the funds appropriated for maintenance of searchlights and electrical equipment for the purchase of parts to replenish the war-reserve stock. The specific appropriation for "reserve equipment, Philippine Islands," provided in the fortification act of June 27, 1914, had been utilized for the accumulation of a war-reserve stock, with the exception of the parts necessary for the reserve for Fort

Drum. It developed that after providing for the latter purpose, sufficient funds would remain available for the replenishment of the war reserve stock, which had been depleted on account of war operations, and steps to this end have been taken with funds under that item.

The experience of this office in connection with the appropriation for the maintenance of searchlights and electrical equipment in the Philippine Islands indicates that with the placing of the Fort Drum power plant on a maintenance basis and its addition to the items maintained under the supplies appropriation, the amount estimated for the fiscal year 1921 should be appropriated in order that ordinary peace-time requirements may be provided for, irrespective of any question of war reserve.

Mr. SLEMP. What is the next item?

INSTALLATION AND REPLACEMENT OF ELECTRIC LIGHT AND POWER PLANTS
AT DEFENSES OF PHILIPPINE ISLANDS.

Col. SHERRILL. The item of \$4,000 for the installation and replacement of electric lights and power plant for the defenses of the Philippine Islands is withdrawn.

INSTALLATION AND REPLACEMENT OF ELECTRIC LIGHT AND POWER PLANTS
AT DEFENSES OF HAWAIIAN ISLANDS.

Mr. SLEMP. There is an item above, that for the installation and replacement of electric light and power plant at the defenses of the Hawaiian Islands, for which an appropriation of \$20,000 was made last year. Was that money expended?

Col. SHERRILL. Under the head of electrical plant, Hawaiian Islands, there was an available balance on December 31, 1919, of \$14,060. We have made no estimate under that head for next year.

Mr. SLEMP. You can return that money to the Treasury?

Col. SHERRILL. This estimate of \$14,060 was returned to the office recently, and subsequent to the date that these estimates were made up. It does not appear here. I see no statement as to whether it will be expended or not, but there is no estimate for next year.

Mr. SLEMP. I am trying to get that \$14,060 back.

Col. SHERRILL. Unfortunately, not having made an estimate for next year, we do not seem to have any data as to how much of that we will spend.

Mr. SLEMP. What did you spend the \$6,000 for?

Col. SHERRILL. I have here a list of the work that we were doing.

Mr. SLEMP. This money is going entirely for the purchase of 25 K. W. sets.

Col. SHERRILL. Yes, sir; that is what it says here.

CONSTRUCTION OF MINING CASEMATES, CABLE GALLERIES, ETC., SUBMARINE MINES, PHILIPPINE ISLANDS.

Mr. SLEMP. The next item is for the construction of mining casemates, etc., Philippine Islands.

Col. SHERRILL. The estimate for 1921 is \$102,000, and the appropriation for 1920 was \$145,000.

Mr. SLEMP. Your estimate has been reduced to \$74,000?

Col. SHERRILL. Yes, sir; the estimate has been reduced to \$74,000. On December 31, 1919, there was an available balance of \$99,100.56; the estimated expenditures to the end of the year are \$44,100.56, leaving a balance estimated for return to the Treasury of \$55,000.

The CHAIRMAN. You mean that \$55,000 of the \$140,000 will not be used during the year?

Col. SHERRILL. That much will be returned.

The CHAIRMAN. That will not be obligated in any way?

DETAILS OF ESTIMATE.

Col. SHERRILL. No, sir. In the item above this one, for the electrical installation, there will be a balance returned of \$57,533.89.

The details of this estimate for casemates for the Philippine Islands are as follows: Completing mine wharf, Fort Hughes, \$55,000. Funds in the sum of \$140,000 were appropriated in the fortifications appropriation act of March 3, 1919, for the construction of a reinforced concrete wharf for the mine service at Fort Hughes to replace an old timber wharf originally constructed by the Engineer Department for construction purposes. The amount of the appropriation was allotted to the district engineer on April 19, 1919. The sum estimated for 1921 is required on account of the fact that it will not be possible to complete the work during the current fiscal year. This is a reappropriation of that item.

Mr. SLEMP. Your item of \$74,000 is to continue the construction of the wharf?

Col. SHERRILL. That item is \$55,000.

The next item is for additional cranes, trackage, etc., for storehouses at Fort Mills and Fort Hughes, \$4,000. This item was included in estimates submitted for the fiscal year 1920. Funds were not appropriated. The equipment is required for the efficient operation of the structures in connection with which it is to be installed. Its installation has been requested by the Chief of Coast Artillery.

The next item is for the purchase and installation of six 16,000-pound cranes at the Fort Mills cable tanks, \$15,000. This item is included in the estimates submitted for the fiscal year 1920. Funds were not appropriated. The cable now being furnished for storage in the cable tanks at Fort Mills is wound on 7-ton reels. The tanks at present are equipped with cranes of but 10,000 pounds capacity, which are insufficient for the handling of the reels now being furnished.

The item for the bombproof casemate at Fort Mills is to be dropped.

Mr. SLEMP. How are you getting along with the construction of the wharf? Will you construct it within the original estimate?

Col. SHERRILL. Yes, sir; the estimate is represented again as being sufficient to carry that out.

Mr. SLEMP. You will complete it next year?

Col. SHERRILL. Yes, sir. The bombproof casemate item has been dropped, in view of the fact that orders have been issued for a revision of the project.

RESERVE ENGINEER EQUIPMENT, HAWAIIAN ISLANDS.

Mr. SLEMP. There was an item of \$3,250 carried last year for reserve engineer equipment in the Hawaiian Islands.

Col. SHERRILL. There is no unallotted balance under that head in the Hawaiian Islands. I have here a list of the allotments made out of that fund, but there is no unallotted balance in it.

RESERVE ENGINEER EQUIPMENT AND STORAGE FACILITIES FOR RESERVE EQUIPMENT, PHILIPPINE ISLANDS.

Mr. SLEMP. The next item is, "For reserve engineer equipment in the Philippine Islands, \$113,200."

Col. SHERRILL. Under that heading, instead of the wording "For reserve engineer equipment in the Philippine Islands," it is desired to substitute the wording "For reserve engineer equipment and for the provision of storage facilities for reserve equipment in the Philippine Islands." The amount estimate for that is \$113,200.

Mr. SLEMP. Will you explain that item?

BOMBPROOFING OIL STORAGE.

Col. SHERRILL. It is proposed to bombproof the reserve oil tanks at Fort Mills to withstand high-explosive shells, for which adequate protection has not been provided. The tanks are 9 feet in diameter by 12 feet long, and it is proposed to drive tunnels 13 feet wide by 14 feet high, lined with concrete, and install the tanks in these tunnels, placed end on end along the center; one tunnel for 20 gasoline tanks and one for 20 mineral oil tanks are to be located on Morrison Hill near the present location of the storage tanks. Also to bombproof the four gasoline tanks at Fort Hughes, for which adequate protection has not been provided, and to install a pump and pipe line for handling gasoline from the tank at Fort Frank to the level of the engine room, about 100 feet in elevation above the storage tank. This project has been before the department, and the Chief of Coast Artillery in indorsement of August 12, 1919, requested that provision for this work be included in engineer estimates for the fiscal year 1921.

Mr. SLEMP. Do your emplacements carry suitable places for keeping oil?

Col. SHERRILL. Each emplacement has a small tank buried under bombproof protection right under the battery. But that is only a limited supply over there and we have to carry much more than in the States because the garrison has to be self-supporting.

Mr. SLEMP. Could you adopt the principle of dispersion of your oil tanks?

Col. SHERRILL. There is no room on Corregidor for that, because it is very restricted in area.

Mr. SLEMP. How much excavation would be required?

Col. SHERRILL. The tunnels are going to be 13 feet wide by 14 feet high and the tanks are 9 feet in diameter by 12 feet long; there are 20 oil tanks and 20 gasoline tanks, so you see there is quite a considerable amount of work.

Mr. SLEMP. About 400 feet, is it not?

Col. SHERRILL. Something in that neighborhood; it is more than that. But that is a much cheaper method than you could have gotten by any bombproof protection because it is under a hill.

Mr. SLEMP. How would you line the tunnel?

Col. SHERRILL. It would have a concrete lining, enough to hold the soil, but if they pass through any of that soft rock they have there it would be unnecessary to put that concrete in.

Mr. BYRNS. These tanks are now entirely exposed to attacks from land?

Col. SHERRILL. Entirely so.

Mr. SLEMP. You have some sort of covering on them now, and would it not be possible to put some more covering on them and give more protection?

Col. SHERRILL. The interest at stake in those tanks, it seems to me, is so great that it would not be advisable to improvise anything that is not a perfect protection. If you go under Morrison Hill, which is a very abrupt hill, you would get an enormous amount of protection simply by the excavation you would make. Moreover, it would make the storage of these things very convenient and accessible to the railroad tracks and the incline tracks which come down on to the wharf, and you could not get that in any other way; if you undertook to disperse these tanks you would have to put them in inaccessible places on the island where they would not be satisfactory, and even then it would be difficult to protect them.

Mr. BYRNS. Do you think it is very essential to have this protection?

Col. SHERRILL. Yes.

Mr. BYRNS. The Navy is proposing to put up a 90,000-gallon tank at Cavite and for that they are only asking \$25,000; that is, for the construction of the tank.

Col. SHERRILL. But I do not believe they contemplate that being anything more than a peace-time arrangement.

LAND DEFENSES IN PHILIPPINES, INCLUDING PROCUREMENT AND INSTALLATION OF SEARCHLIGHTS AND ACQUISITION OF LAND AND RIGHTS OF WAY.

The next item is:

For land defenses in the Philippine Islands, including the procurement and installation of searchlights and the acquisition of land and rights of way, \$407,000.

It is recommended that that entire item be dropped, for the very reason that we have just given, that the cover they propose can be improvised and is not absolutely essential.

LAND DEFENSES IN HAWAIIAN ISLANDS, INCLUDING PROCUREMENT AND INSTALLATION OF SEARCHLIGHTS AND ACQUISITION OF LAND AND RIGHTS OF WAY.

Mr. SLEMP. The next item is:

For land defenses in the Hawaiian Islands, including the procurement and installation of searchlights and the acquisition of land and rights of way, \$560,000.

How much of this goes for land?

Col. SHERRILL. There is no item for land this year.

Mr. SLEMP. And nothing for the procurement and installation of searchlights?

Col. SHERRILL. Yes, sir. I will give you the net available balance, and then I will give you the items. On December 31, 1919, there was available \$204,267.50, and it is estimated that there will be returned to the Treasury \$129,904.83, and the estimated expenditures between December 31 and the end of the year being \$74,362.67. The two items covered by this estimate are, first, the modification of Battery Birkhimer, \$60,000, which consists of the removal of mortars from the existing pits of Battery Birkhimer and remounting them on the rim of Diamond Head Crater. The vacant pits are to be converted into storage magazines. Available funds have been allotted to cover the cost of this work, \$91,000, but it is estimated that the amount submitted will be required, as it will not be possible to complete the work during the current fiscal year. That will be in the nature of a reappropriation of \$60,000 of that amount.

Mr. SLEMP. How much did you say you were going to return to the Treasury on June 30?

Col. SHERRILL. We are going to return \$129,000, on the assumption that we will spend for this battery \$31,000; in other words, at the end of the year there will be \$31,000 expended on that battery and \$60,000 worth of work yet to be done, and on that basis we will return at the end of this fiscal year \$129,000.

Mr. SLEMP. Then you would return to the Treasury \$129,000 and ask for \$60,000?

Col. SHERRILL. Yes, sir.

MILITARY ROADS.

The next item is military roads. Under date of February 25, 1920, The Adjutant General approved in principle the project for military roads on Oahu, submitted September 27, 1919, by the commanding general Hawaiian Department, and authorized the Chief of Engineers to defend the \$500,000 included in the 1921 estimates for initiating work. The total cost of the revised project is \$4,899,000. I would like to say that I consider that the most important of all the estimates we have in the whole bill, because by the construction of these roads on the island of Oahu it will make the garrison many times more effective, and it will much more than double its effectiveness both as to the Infantry and the mobile Artillery.

Mr. SLEMP. How many miles of road is it proposed to build, taken as a whole? You have a plan laid out, have you not?

Col. SHERRILL. Yes: we have a very detailed plan for that and we have a chart here showing just how those roads are located. It is the result of a very detailed project, which, as I say, is the most important single project that we have in the whole estimate, and I know it is so considered by the War Plans Division. The theory of the defense over there is that we must make a defense of Oahu by keeping the enemy from getting on shore, and in order to do that we have to have roads by which to reach rapidly every point on

the island. The big concentration point is here, Schofield Barracks [indicating on map], and in order to make an effective defense at all parts of the island we must be able to move rapidly in any direction. Here is one road that is considered absolutely vital, and it is quite a difficult one to construct [indicating]. It goes through this high ridge of mountains. [Indicating.] Another one is this through here, with some branches. [Indicating.]

Mr. SLEMP. Have you no roads already built over there?

Col. SHERRILL. Yes; they have roads built, and the road from Schofield Barracks down through here to Diamond Head Crater [indicating] is in pretty good condition and will be kept up by the local inhabitants, but the ones that we propose here [indicating] are absolutely for military purposes and are to be built and should be built by the Government.

Mr. OGDEN. What character of road is it to be?

Col. SHERRILL. The department commander has submitted a classification of roads. Class 1A is to be of the best reinforced-concrete construction.

Capt. GARLINGTON. That is represented by this blue line. [Indicating.]

Col. SHERRILL. Class 1B is to be a surfaced macadam road, and class 1C is to be a well-drained dirt road with metalled surface, well rolled. He has divided these up with a great deal of detail, with a detailed estimate of each one, with the locations. The original estimate called for \$15,000,000 worth of roads; after consideration by the War Department it was sent back to the department commander and he revised his figures, cutting out some of the concrete roads and also cutting out certain of the roads to be improved under any circumstances, and we have now gotten it down to less than \$5,000,000—\$4,899,000—which is the total of the project.

Mr. BYRNS. How many miles of road will you have when the project is completed?

Col. SHERRILL. We have that, but we will have to insert it.

Mr. SLEMP. This is an Infantry proposition rather than an Artillery proposition?

Col. SHERRILL. It is a mobile artillery proposition, a field artillery proposition, and an infantry proposition; it is really a land defense proposition, and the Chief of Coast Artillery is interested in the other features of it; that is, his railroad artillery and the batteries are here at Ahua Point and up here in the neighborhood of Schofield Barracks.

Mr. SLEMP. You will put in the record a statement showing the total number of miles involved, the character of the road, and showing the places where the roads will be built?

Col. SHERRILL. We will insert that in the record.

Mr. SLEMP. And let your statement also show the strategical advantages involved?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. I think you should insert in that statement also the number of miles of saving that you would get by the roads?

Col. SHERRILL. That will be covered in the statement of strategical advantages.

STATEMENT COVERING PROJECTS FOR MILITARY ROADS IN OAHU ISLAND.

The project as submitted by the department commander, which has been approved in principle by the War Department, and forms the basis of this estimate, contemplates that 131.4 miles of road will be built at the expense of the United States, and that, in addition to the above, the necessary culverts and bridges will be built at the expense of the United States, on roads totaling 112.6 miles in length. This gives a total of 244 miles on which money will be spent by the United States.

The plans submitted propose three classes of construction, as follows:

	Miles.
Class 1-a, reinforced concrete-----	12.8
Class 1-b, macadam-----	36.2
Class 1-c, dirt road, metalled and rolled-----	82.4

There follows a list of these roads, with the length, total cost, and unit cost of each road.

Class 1-a:

Moanalua to Fort Kamehameha, 3.4 miles at \$50,000 per mile (one-half to be assumed by Navy Department)-----	\$85,000
Schofield to Waianae, 9.4+ miles at \$80,000 per mile-----	754,000

Class 1-b:

Ewa to Waialae, 4.8+ miles at \$36,000 per mile-----	175,000
Aiea to Naval Reservation, 3.7+ miles at \$27,000 per mile-----	101,500
Schofield to Kahana Bay, 18.3 miles at \$33,400 per mile-----	612,500
Road A, Ewa Road to Puu Makakilo, 9.4+ miles at \$29,700 per mile-----	280,000

Class 1-c:

Wahiawa Reservoir to Puu Makakilo, 10 miles, at \$20,000-----	200,000
Dillingham branch, 4.5+ miles, at \$22,000-----	100,000
Moanalua to Fort Kamehameha, 4 miles, at \$20,000-----	80,000
Nanakuli branch, 4.5 miles, at \$20,000-----	90,000
Schofield to Waianae, 3 miles, at \$20,000-----	60,000
Waialaa branch, 1.1 miles, at \$23,000-----	26,000
Schofield to Waimea, 20 miles, at \$15,000-----	300,000
Diamond Head to Maunaloa, 3 miles, at \$20,000-----	60,000
Maunaloa to Waimanalo, 3.3 miles, at \$56,000-----	185,000
Waimanalo to Kaneohe, 2 miles, at \$20,000-----	40,000
Heela branch, 3.6 miles, at \$20,000-----	72,000
Browns Camp to Barbers Point, 17+ miles, at \$21,000-----	360,000
Barbers Point to Gilbert, 2 miles, at \$27,000-----	54,000
Ewa Mill to Shore, 2.6 miles, at \$20,000-----	52,000
Road C, 1.8 miles, at \$20,000-----	36,000

The following projects consist in bridge and culvert work only:

Ewa Junction to Waialae, 10.7 miles-----	\$80,000
Honolulu to Pali, 4.9 miles-----	70,000
Puukiki to Ewa Junction, 17.4 miles-----	165,000
Wainanalo to Pali, 4.9 miles-----	50,000
Pali to Kahana Bay, 18.1 miles-----	175,000
Kahana Bay to Kahuku Point, 13.2 miles-----	128,000
Kahuku Point to Puukiki, 15.1 miles-----	145,000
Haleiwa Cut-off, 2.3 miles-----	23,000
Puukiki to Quarri site, 5.7 miles-----	55,000
Makua to Browns Camp, 16.3 miles-----	165,000
Honouliuli to Ewa Junction, 4 miles-----	35,000

In connection with the above it should be understood that the culvert and bridge work will be done only when proper guaranties can be secured that the road proper will be improved and maintained with city or county funds. It is also desired to point out that while the above classification of roads forms the basis of the estimate, it will probably prove advisable to make certain changes in details as the work progresses; and it is anticipated that the type of roads described under class 1-c will not prove substantial enough and that the light macadam road will have to be built.

The strategic importance of these roads is derived from the fact that not only will they enable troops to proceed in the shortest possible time to any point

threatened by the enemy, but that they will insure the supply and maintenance of these troops after the troops themselves have reached their destination. The existing roads of the island, while apparently very good roads to a person traveling over them casually, are nearly all likely to become impassable in bad weather and none of them will stand up for more than a few days under the continuous heavy traffic incident to military operations. The main value of a good road system does not lie in the fact that it permits the troops themselves to proceed directly to their destination, but in the fact that only by having roads that will stand severe traffic can these troops be supplied with all things they need when in contact with the enemy, viz, ammunition, food, etc., which must be replenished continuously.

Therefore, while the item of distance or saving in distance has a certain bearing on the problem, the exact saving is not important, it being absolutely essential that the very shortest distance be followed. In other words, even if a road only saves 2 miles, the gain is well worth the cost, because of the continually repeated trips that the supply columns make over it at a saving of 2 miles each trip, which amounts to a large total saving within a very short time. The exact figures, in this respect, in the two most important roads are as follows:

(a) Distance from Schofield Barracks to Kahana Bay on the east coast over the existing road is 34 miles; over the proposed road it would be 18.3 miles.

(b) The distance to Wainae from Schofield Barracks over the existing road is 29 miles; over the proposed road it would be 12.4 miles.

Another feature accomplished in the routes selected for both these roads is that in each case a line of communications proceeding directly to the rear at right angles to the line of contact with the enemy is afforded, which is a cardinal strategic principle.

PROCUREMENT OR RECLAMATION OF LAND FOR FORTIFICATION AND COAST DEFENSE PURPOSES IN HAWAIIAN ISLANDS.

Mr. SLEMP. The next item is "For procurement or reclamation of land, or rights pertaining thereto, needed for the site, location, construction, or prosecution of works of fortifications and coast defenses in the Hawaiian Islands, \$250,000." The estimate has been reduced to \$205,760.

DETAILS OF ESTIMATE.

Col. SHERRILL. Yes, sir. The project for the defense of the Hawaiian Islands includes emplacements for two 16-inch guns at Barbers Point and two 12-inch long-range guns at Waialua Bay, Oahu. The sites required for this armament are not owned by the Government and for its accommodation it is proposed to acquire a tract of 143 acres at Barbers Point with a right of way 50 feet wide to the nearest public road, together with a site containing 200 acres at Waialua Bay. The details of the estimate are as follows: Barbers Point site, 143 acres, at \$100, \$14,300; right of way, \$9,000, and contingencies, \$2,460, making a total of \$25,760. At Waialua Bay site, 200 acres, at \$800 per acre, \$160,000, contingencies, \$20,000, making a total of \$180,000. The total estimate covering both points is \$205,760. An estimate of \$250,000 for sites, Hawaiian Islands, was submitted for inclusion in 1920 fortifications bill, to cover the acquisition of the Barbers Point site, together with a site at Waialua Bay. Funds were not appropriated. Now, the land at Barbers Point is absolutely essential to give a site for these two 16-inch guns necessary to give adequate protection to the naval base, which is the controlling feature in this whole plan for the defense of Oahu. In other words, unless the naval station is adequately protected, we

might as well not have any garrison on this island. An investigation of this matter has indicated that the present armament is defective in long-range guns of great power.

Mr. SLEMP. Where is your armament located now?

Col. SHERRILL. The only long-range armament consists of two 12-inch guns at Fort Kamehameha. That leaves the southwestern direction open to hostile fire, right into the heart of this naval station, and for that reason it has been decided by the War Department to use those 16-inch guns on Barbers Point in such a position that they will cover not only the front but both flanks, thereby protecting the naval base.

Mr. SLEMP. What is the necessity for all of this land to establish a base for two guns?

Col. SHERRILL. It is essential to have the necessary area there for the guns and the auxiliaries that go with those emplacements for the storage of ammunition, for facilities to take care of the personnel, the fire-control stations that go with the guns, the rights of way, etc.

Mr. SLEMP. How many acres did you say were required there?

Col. SHERRILL. One hundred and forty-three acres, all told.

Mr. SLEMP. Is not that too much?

Col. SHERRILL. No, sir; I do not think so. The usual trouble we have had on those sites is that we have not, in the first place, had enough land to take care of the utilities.

Mr. SLEMP. What is the price per acre at Barbers Point?

Col. SHERRILL. \$100 per acre.

WAIALUA BAY PROJECT.

Mr. SLEMP. Why should the land at Waialua Bay be priced at \$800 per acre?

Col. SHERRILL. That is sugar-cane land and much more valuable.

Mr. SLEMP. Is it not possible for the fortifications to be located on some other site in less expensive territory?

Col. SHERRILL. No, sir; that has been fully investigated both by the commanding general, the artillery board, and the district engineer, and they all concur in that location.

Mr. SLEMP. How many acres do you propose to buy at Waialua Bay?

Col. SHERRILL. Two hundred acres. The reason for that is that we used to need land for the armament that is now proposed, and we also need additional armament there. We need the land to take care of the auxiliaries and for the troops that will be stationed up in that vicinity in connection with the defense of that shore. Moreover, there is a possibility that we will need additional land for the auxiliaries of the batteries, as well as for use in connection with the railroad artillery that will go out there, the main station for which would be at Scofield Barracks.

Mr. SLEMP. Two hundred acres of land at that price will cost a great deal of money, and you would have to have a tremendous number of buildings to take up that area of 200 acres?

Col. SHERRILL. That includes not only the batteries, but it includes the area in front of those batteries, which is a considerable area, and which you have to buy in order to protect the fire. You can not

locate batteries right on the edge of the reservation and simply buy a little area in there, but you must buy out for a considerable distance in order to protect the local inhabitants. You would have to prevent buildings going up in that locality.

Mr. SLEMP. How many batteries will be there?

Col. SHERRILL. That has not been determined. It is a question as between two or four 12-inch guns.

Mr. SLEMP. How many men would have to be provided for?

Col. SHERRILL. These 12-inch batteries have 109 men each.

Mr. SLEMP. The same conditions would prevail at Barbers Point?

Col. SHERRILL. Yes, sir.

The CHAIRMAN. Does the Chief of Coast Artillery concur in the necessity for these batteries being put up there at Barbers Point?

Gen. COE. I concur in the necessity for the erection of one 16-inch battery of two guns in the vicinity of Barbers Point. I think the exact location on Barbers Point will probably be changed by further study.

Mr. SLEMP. What have you to say as to Waialua Bay?

Gen. COE. My thought about that is that it is not necessary to undertake that construction work at the present time nor to undertake the acquisition of the site. There will be sent to Honolulu, probably this coming summer, certain railroad ordnance. The War Department has already approved the project. The trucks will have to be modified on account of the gauge of the railroad there.

Mr. SLEMP. Does Waialua Bay have a railroad to it?

Gen. COE. Yes, sir; the railroad line runs around the coast by Waianae Bay on the west side. The railroad runs long from Waianae Bay, around Kaena Point, past Kahuku.

The CHAIRMAN. As I understand it, there is a 36-inch narrow-gauge road?

Gen. COE. Yes, sir. There is also another road running from Kahuku to the vicinity of Kahana Bay.

Mr. SLEMP. Your thought would be to utilize the available railroad mounted artillery. Would not that involve the construction of a railroad?

Gen. COE. No, sir; only a spur.

Col. SHERRILL. There has been no sufficient investigation of this railroad project. There has been a sort of superficial investigation, but not by any means a sufficient one. Moreover, the view which is expressed by Gen. Coe is not the War Department's view. The view I have expressed here is the War Department's approved project.

Gen. COE. That is not exactly so, and, of course, the question of what action is to be taken in the case at Waialua Bay is held in abeyance pending further report from the commanding general of the Hawaiian Islands.

Col. SHERRILL. The War Department has approved the purchase of this land because it is necessary in any case. The point is that we have funds which have heretofore been allotted to that place; and if there is no land, we will be held up indefinitely waiting for it. The War Department has decided that they need that land, and that we should go ahead with it, extending the project by extending the mobile armament that Gen. Coe speaks of. That is intended merely to supplement the other armament, and it would not be effective in doing what this proposed armament is supposed to do.

Mr. EAGAN. Are there any buildings on this land now?

Col. SHERRILL. None except just local farm buildings. It is now used for sugar cane.

Mr. SLEMP. Have you figured on some of the 14-inch guns being substituted for the 12-inch guns, so as to give your batteries longer range and greater power?

Gen. COE. The only place where we have considered installing 16-inch guns——

Mr. SLEMP (interposing). My thought was this: You spoke of installing 12-inch guns at Waialua Bay, and my question was why, since you have a large number of 14-inch guns, you should not install 14-inch guns there?

Gen. COE. I misunderstood your question. It is my opinion that 14-inch guns would be employed on that site if guns are to be installed there. We can not use the 14-inch railroad guns over there on account of the light nature of the present railroad, and it would cost more money to make the railroad capable of handling them than it would cost to put in the gun itself.

Mr. SLEMP. The topography of the country on the other side——

Col. SHERRILL (interposing). That makes a good defense or a natural defense.

Gen. COE. A 16-inch gun located at a point in the vicinity of Puuloa, rather than at Barbers Point, would have certain advantages in its field of fire and, as a matter of fact, would cover an area there of about 15,000 yards over Honolulu Bay. They will also, by moving them from this point, Barbers Point, to Puuloa, cover the area in here [indicating on map], which will protect Pearl Harbor and the vicinity of Fort Shafter, which is the approved location of certain reserve storehouses, from bombardment from the waters east of the island. It will be equally effective in the protection of this part of the coast line [indicating].

Mr. SLEMP. Of a barbette type?

Gen. COE. Yes; with all around fire.

Mr. SLEMP. And what elevation?

Gen. COE. A range of 48,500 yards and an elevation of 45 or 65 degrees.

PLANS FOR FORTIFICATIONS AND DEFENSE WORKS, PHILIPPINES AND HAWAIIAN ISLANDS.

Mr. SLEMP. The next item in the bill is for the preparation of plans for fortifications and other works of defense at the following localities: In the Philippine Islands, \$3,000, and in the Hawaiian Islands, \$3,000.

Col. SHERRILL. Those items are along the same line as the items in the United States, to take care of the detail plans and investigations made by the engineers where funds are not specifically allotted for the work.

Mr. SLEMP. You have never had this before, and why the sudden interjection of these items?

Col. SHERRILL. In the Philippine Islands, for instance, they have heretofore had general funds for battery construction and that took care of practically all construction work in the Philippine Islands.

Mr. SLEMP. You have an office there, which we discussed a while ago, at an annual charge of \$15,000, and with no very large amount of construction work to do. Why could not that office arrange to take care of these plans?

Col. SHERRILL. I will read you what they say:

These estimates are submitted in order to provide funds at each of the above localities from which can be paid the cost of the preparation of plans for construction work in advance of the appropriation of funds therefor. Under the provisions of the fortifications appropriation act approved February 13, 1913, estimates for engineer construction work in connection with fortifications are not to be submitted to Congress until after plans and estimates of cost have been prepared therefor. The preparation of plans and estimates is ordinarily chargeable to the appropriation from which the cost of construction work covered by such plans and estimates is paid. In the absence of funds under the general appropriations, plans and estimates can not be prepared. It is to meet such conditions that the funds covered by the 1921 estimates are required.

The office that you spoke of is for the care and upkeep of the fortification, but this is specifically for any plans and investigations which we may call on them to make. It would be used for the employment of personnel, matériel, and services required for that purpose.

Mr. SLEMP. Do you not think that as far as the Philippines are concerned these plans could be taken care of by your office there?

Col. SHERRILL. I think as far as the Philippines are concerned we can afford to drop that, because that is simply to provide for a contingency that may not arise, as we do not expect any new work. However, I would request that you leave in the item for the Hawaiian Islands, because there we have a great deal of work.

CONSTRUCTION OF BREAKWATER, FORT MILLS, P. I.

Mr. SLEMP. The next item in the bill is "for the construction of breakwater at Fort Mills, P. I., \$152,000."

Col. SHERRILL. We recommend that that be dropped.

Mr. SLEMP. You can get along without that breakwater for another year?

Col. SHERRILL. We do not want the breakwater at all, and that is based on information received from officers who have been stationed there. For instance, I have been stationed there and Col. Kingman has been stationed there, and we do not feel that the storms to which they are subjected are sufficient to make it absolutely essential to have that; occasionally they have storms which make it necessary for small craft to put out to Manila, but that is a very rare thing, and I think they can very well get along without it.

CONSTRUCTION OF ENGINEER WHARF, FORT MILLS, P. I.

Mr. SLEMP. The next item is "for the construction of engineer wharf, Fort Mills, P. I., \$75,000."

Col. SHERRILL. The present engineer dock is a wooden structure, which will not last more than another year. It is proposed to build a new concrete piling dock, with a wooden deck, to give facilities for handling coal for launches, mine planters, etc., as at the present dock. Detailed plans and estimates for this work have been prepared by the district engineer, the total estimated cost being \$75,000.

Mr. SLEMP. How old is the present wharf? When was it built?

Col. SHERRILL. That was built at the time these works were first started, about 1911, I think.

Mr. SLEMP. What is the maintenance charge of it?

Col. SHERRILL. Of the wharf?

Mr. SLEMP. Yes.

Col. SHERRILL. You mean how much?

Mr. SLEMP. Yes.

Col. SHERRILL. The small amount that has been used there has been paid out of engineer or quartermaster funds, whatever works were benefited by it. It is in a very dilapidated condition, and I saw it myself in 1915.

Mr. SLEMP. Is this the only wharf you have there?

Col. SHERRILL. No; it is not the only wharf there; they have a quartermaster wharf there, but this is the engineer wharf.

Mr. SLEMP. Is it necessary to have two wharves?

Col. SHERRILL. Yes.

Mr. SLEMP. Why?

Col. SHERRILL. In the first place, the quartermaster wharf is very limited in size, and this one is at the site of the engineer activities, where all the engineer materials are taken in, at a different place on the island.

Mr. SLEMP. You do not have concrete piling in this case, do you.

Col. SHERRILL. Yes; concrete piling and a wooden deck.

Mr. SLEMP. How long would it take you to construct that wharf?

Col. SHERRILL. We can construct it during the year. You can see from the sum of money involved that it is a rather small affair; it really amounts to a small launch landing.

Mr. EAGAN. How near are these two wharves to each other?

Col. SHERRILL. They are on opposite sides of the small cove—that is, on the Manila side of the bay—and one is over on this side and one on the other, I guess about 600 or 700 yards apart, on the opposite side of that cove; I think that would be excessive; I do not suppose they are more than 400 yards apart; I do not recall exactly.

Mr. SLEMP. Do you handle very much business over your engineer dock?

Col. SHERRILL. You see, those people are entirely dependent on water transportation, and they can not move without it; consequently they always have a couple of boats running back and forth to Manila, so that they keep the quartermaster wharf occupied all the time; this other dock is the one at which we take in coal and supplies; it is really a service wharf.

Mr. SLEMP. What is the population of Fort Mills?

Col. SHERRILL. According to the last account I had it was about 4,000, quite a large population for such a small place.

CONSTRUCTION OF SEACOAST BATTERIES, HAWAIIAN AND PHILIPPINE ISLANDS.

Mr. SLEMP. The next item is "For construction of coast batteries, as follows: In the Hawaiian Islands, \$50,000; in the Philippine Islands, \$67,000." Have you any available balances under that head?

Col. SHERRILL. For battery construction, Oahu, on December 31, 1919, there was a balance of \$420,687.05, of which it is estimated the \$380,000 will revert to the Treasury.

Mr. SLEMP. How much more work will you do this year?

Col. SHERRILL. We estimate that we will spend \$40,687.05 between December 31 and June 30.

Mr. SLEMP. You are asking—

Col. SHERRILL (interposing). \$50,000 to complete the 12-inch battery at Ahua Point.

Mr. SLEMP. That would leave a net return of \$330,000?

Col. SHERRILL. Yes, sir; \$330,000.

Mr. SLEMP. The 12-inch long-range battery will be completed during this fiscal year?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. What have you to say in regard to the Philippine Islands item?

Col. SHERRILL. This item calls for \$67,000. On December 31 there was an available balance of \$87,292.74. It is estimated that all of that will be expended before the end of the fiscal year. This item is for the completion of the general project for battery construction, on Manila Bay, \$17,000; for the completion of 12-inch long-range battery under construction at Fort Mills, \$50,000, making a total of \$67,000. The funds covered by the estimate for completing the general project for battery construction, Manila Bay, are required for the completion of work at Fort Drum, including the installation of trolley rails and electric ranges; for the interconnection of power plants at Fort Hughes; and for the operation of floating plant required for the handling of material and personnel between the different fortified islands in Manila Bay. That floating plant is what is used by the personnel in going back and forth to Fort Drum, Corregidor Island. The other item is for the completion of the 12-inch battery, which is detailed here.

Mr. SLEMP. How much have you expended on that battery up to date?

Col. SHERRILL. \$283,000 was provided in the fortifications appropriation act approved July 8, 1918, for the 12-inch battery at Fort Mills, and the entire appropriation was allotted to the district engineer.

Mr. SLEMP. You will not construct the battery within the estimate?

DETAILS OF ESTIMATE.

Col. SHERRILL. No, sir. This battery is now under construction with funds—\$283,000—provided in the fortifications appropriation act approved July 8, 1918. The entire appropriation was allotted to the district engineer, Manila, July 27, 1918. Under date of September 30, 1919, the unexpended balance of the appropriation was \$238,832.17, with outstanding liabilities of \$141,792.30, leaving an unobligated balance of \$97,039.87. The amount estimated for 1921 is required for the completion of the battery and operation of floating plant used in connection with its construction, as follows: Installation of four 25-kilowatt set, \$2,000; installation of cable interconnecting power plant, \$3,400; installation of lighting fixtures, \$2,000; installation of 8 fans, \$160; installation of switchboard, \$200; installation of auxiliary power for central plant, \$200; purchase and

installation of mechanical range devices, \$1,500; installation of trolley rails and shot tables, \$2,000; manufacture and installation of doors, \$5,290; 27,500 cubic yards of back fill over emplacement No. 1, \$11,000; removal and storage of construction plant, \$1,500; operation of floating plant, \$15,000, making a total of \$44,250, to which 10 per cent, or \$4,425, is added, making in round numbers, \$50,000.

Mr. SLEMP. Is that item of \$15,000 for the operation of the floating plant a duplication of the one you mentioned before?

Col. SHERRILL. I think that is provided there as applied to this particular job. That battery is not being built within the original estimate. That estimate was made in 1916.

Mr. SLEMP. The construction of your long-range battery at Oahu came within the estimate, did it not?

Col. SHERRILL. Yes, sir; that is virtually within the estimate. Three hundred and fourteen thousand dollars has been allotted, and a considerable amount of that will be turned back, but that was due to the fact that you appropriated for two additional guns that we did not build.

WEDNESDAY, MARCH 24, 1920.

STATEMENTS OF BRIG. GEN. R. C. MARSHALL, JR., CHIEF OF CONSTRUCTION DIVISION, AND COL. C. L. CORBIN.

Mr. SLEMP. Gen. Marshall, state what position you occupy in the Government service.

Gen. MARSHALL. Chief of the Construction Division, War Department.

Mr. SLEMP. You have certain items in the bill which you wish to present. With what indorsement do these items come to you as the head of the Construction Division?

Gen. MARSHALL. Generally speaking, they come from the local authorities at each of the posts or forts where the proposed structure is to be placed and have the approval of the bureau chief involved; the Chief of Coast Artillery in the case of the appropriations "Seacoast defenses, Philippine Islands and Hawaii, and barracks and quarters, seacoast defenses"; in the case of the Panama Canal Zone it has the approval of the commanding general of the Panama Canal, and the estimates of cost are prepared there. We have little or no data upon which to check the estimates of cost at the Panama Canal, by reason of the fact that all the construction work is done by the canal authorities.

Mr. SLEMP. Is the desirability of these various items determined by you personally, or do you simply do the construction work after decision has been reached by other Army officials?

Gen. MARSHALL. Generally speaking, upon decisions reached by other Army officials. Of course, if anything comes to me and I know of any reason that has not been taken into consideration in rendering the decision, I would call attention to that for reconsideration.

Mr. SLEMP. General, inasmuch as that appropriation was made for war purposes and generally for temporary construction, would you not think it proper to let that money revert to the Treasury at the end of this fiscal year?

Gen. MARSHALL. Yes; and that is the reason we have put in a new estimate. In consultation with the Chief of Coast Artillery that has been determined upon.

Mr. SLEMP. That is, that you would return to the Treasury at the end of the fiscal year \$2,000,000?

Gen. MARSHALL. The exact amount available is \$2,050,000.

Mr. SLEMP. And any work done in the next fiscal year under this item will be done in accordance with the new appropriation?

Gen. MARSHALL. Yes.

Mr. SLEMP. I assume you are not proposing to do any construction work or any temporary building in any way for housing troops or for increasing facilities at the various posts. You are not doing any work of that kind?

Gen. MARSHALL. In this fiscal year I know of no instance where we have used those funds for housing. As I say, we have used that appropriation on docks and wharves and incinerators, and things like that.

Mr. SLEMP. That was in order to add permanent facilities to the various posts?

Gen. MARSHALL. It happens to be permanent, but it was necessary for the operation of the posts, which the appropriation contemplated. You can not build a temporary wharf, for instance, very well.

POLICY RELATIVE TO TEMPORARY STRUCTURES.

Mr. SLEMP. In regard to the temporary structures at the various posts, I would like to ask you your policy with regard to their preservation or salvaging or removal.

Gen. MARSHALL. At the temporary posts the temporary buildings are being kept until the policy with respect to the Army is determined through legislation.

Mr. SLEMP. Is there any money expended on them at all?

Gen. MARSHALL. Practically none. Of course, if a roof leaks, the building is going to be ruined inside because of that leak, we have it inspected periodically to discover such things and to that extent protect them.

Mr. SLEMP. You are not asking for very much money for that purpose?

Gen. MARSHALL. We are not asking for any money for that purpose. We are asking for so many employees at these places where we have material on hand, and it is the duty of these employees to take care of all the buildings on the reservation.

DETAILS OF ESTIMATE.

Gen. MARSHALL. The proposed expenditure on barracks and quarters, seacoast defenses, is \$234,647. I have this list here of two pages and then the details of each one of the proposed expenditures. For example, the first one is at Fort Adams (R. I.) coast-defense machine

Chesapeake, coast defenses of—Continued.

Improvement Fort Story and Fort Monroe	\$48,400. 00	
Reroofing buildings, Fort Monroe	18,750. 00	
Reconstruction quartermaster and mine wharf, Fort Monroe	8,000. 00	
		<u>\$114,775. 00</u>

Delaware, coast defenses of:

Incinerator—		
Fort Dupont	5,000. 00	
Fort Mott	3,500. 00	
		<u>8,500. 00</u>

Long Island Sound, coast defenses of:

Moving building 13, Fort Wright	3,500. 00	
Sinking test well, Fort Wright	5,000. 00	
Placing piles at wharf, Fort Michie	3,000. 00	
		<u>11,500. 00</u>

Los Angeles, coast defenses of:

Vegetable storage cellar		108. 00
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Mobile Bay, coast defenses of:

Install boilers, Fort Morgan		7,000. 00
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Narragansett, coast defenses of:

Additional garage, Fort Adams	2,173. 00	
Hot-water heating system, Fort Adams	1,283. 00	
		<u>3,456. 00</u>

New Orleans, coast defenses of:

Floating wharf and removable ramp (Jackson Barracks)		19,228. 00
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New York, coast defenses of:

Reconstruction of coal shed, Fort Wadsworth	3,605. 00	
Incinerator, Fort Hamilton	10,000. 00	
Concrete road, Fort Tilden	2,000. 00	
		<u>15,605. 00</u>

Portland, coast defenses of:

Railway spur track, Fort Preble	12,000. 00	
Cement-floor garage, Fort Williams	2,350. 00	
Replacing roof on garage	734. 00	
Lighting system, Fort Levitt	12,017. 00	
Sewer connections, Fort Williams	984. 00	
Sewer connection, switchboard room, Fort McKinley	628. 00	
		<u>28,713. 00</u>

Puget Sound, coast defenses of:

Gravel road and sidewalk, Fort Casey	15,249. 00	
Additional water mains and hydrants, Fort Ward	16,500. 00	
Construction quartermaster wharf, Fort Woods	4,435. 45	
Reconstruction quartermaster wharf, Fort Flagler	4,314. 80	
Ice-water supply	20,000. 00	
Alterations bakery building, Fort Flagler	700. 00	
		<u>61,199. 25</u>

San Francisco, coast defenses of:

Construction frame oil house	695. 00	
Constructon sidewalk, Fort Scott	254. 10	
		<u>949. 10</u>

Savannah, coast defenses of:

Alteration to boathouse, Fort Screvens	1,500. 00	
500 feet concrete road, Fort Screvens	2,131. 50	
Incinerator and building	6,500. 00	
		<u>10,131. 50</u>

Tampa, coast defenses of:

Reservoir	900. 00	
Ice-making machinery, Fort Dade	10,500. 00	
Outstanding obligations against power plant at Fort Dade, authorized May 21, 1918	8,000. 00	
		<u>19,400. 00</u>

Grand total		<u>357,944. 85</u>
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NOTE.—It is not proposed to use any money of this appropriation during the remainder of this fiscal year, except for such very minor emergencies as may arise.

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shop, remodeling entire interior and enlarging 21 windows, \$2,700, and so on, down the list.

Mr. SLEMP. Suppose you just read those off.

Gen. MARSHALL. Yes; and I can go into the detail of them practically as much as you desire.

Adams, Fort, R. I., coast-defense machine shop, remodeling entire interior and enlarging 21 windows-----	\$2,700
Caswell, Fort, N. C., addition to coast-defense machine shop, 20 by 20 feet, brick-----	4,000
Crockett, Fort, Tex.:	
Ordnance storehouse-----	37,050
Addition to coast-defense machine shop, 20 by 20 feet, brick----	4,000
Dupont, Fort, Del., addition to ordnance machine shop, 24 by 24 feet, frame and installing toilet facilities-----	2,300
H. G. Wright, Fort, N. Y.:	
Remodeling coast-defense machine shop and constructing addition, 20 by 20 feet, brick-----	4,200
Wagon shed, 30 by 110 feet, frame-----	5,600
Warehouse and boathouse on dock at New London-----	14,600
Hamilton, Fort, N. Y.:	
Remodeling quartermaster office-----	8,460
Ordnance magazine, 40 by 150 feet, reinforced concrete-----	25,100
Warehouse for storing paints, oils, and gasoline-----	3,150
MacArthur, Fort, Calif., addition to coast-defense machine shop, 18 by 20 feet, reinforced concrete walls 2 feet and 2 feet 6 inches thick-----	5,000
Moultrie, Fort, S. C., addition to coast-defense machine shop, 20 by 20 feet, brick-----	4,000
Monroe, Fort, Va.:	
Addition to coast-defense machine shop, brick, 40 by 20 feet, wing 17 by 21 feet-----	12,000
Additional story to quartermaster's office building, brick-----	7,637
New Booster pump house, brick-----	4,800
Preble, Fort, Me., remodeling coast-defense machine shop and addition 20 by 20 feet, brick-----	4,000
Rosecrans, Fort, Calif., addition to coast defense machine shop, 17 by 31 feet, frame-----	1,650
Screvens, Fort, Ga., addition to coast defense machine shop, 20 by 20 feet, brick-----	4,000
Stevens, Fort, Oreg., addition to coast defense machine shop, 15 by 14 feet, frame-----	700
Totten, Fort, N. Y., remodeling coast defense machine shop and addition, 28 by 45 feet, brick-----	6,000
Wadsworth, Fort, N. Y.:	
Remodeling headquarters building-----	8,800
New quartermaster stable, 26 by 100 feet, frame-----	10,000
Wagon shed, 25 by 100 feet, frame-----	4,000
Remodeling sawmill, including carpenter shop-----	2,700
Hay shed, 40 by 75 feet, frame-----	2,500
Ordnance repair shop, 30 by 72 feet, brick-----	6,500
Winfield Scott, Fort, Calif.:	
Quartermaster shops, two buildings, 40 by 129 feet, frame-----	28,600
Additional wing to coast defense machine shop, 12 feet 9 inches by 15 feet 6 inches, brick-----	600
Worden, Fort, Wash., coast defense machine shop, 100 by 30 feet, reinforced concrete-----	10,000
Total-----	234,647

COAST DEFENSE MACHINE SHOPS.

Gen. MARSHALL. It will be noted that most of the items are for coast defense machine shops. The necessity for the additions to these shops is brought about by the fact that the Ordnance Depart-

ment is shipping to each of these places the additional machinery necessary to take care of the repairs to the ordnance matériel at those places, and of course, this machinery can not be used unless there is a place to put it in, and the machine shops now are all used to their capacity and these additions are the additions made necessary at each place by the particular machinery being sent to that place.

I have a memorandum of the necessity on each one of these items which is taken from all the information we have and boiled down for presenting the case briefly. I can make a statement of each one or insert in the record the statement on each one just as the committee pleases.

Mr. SLEMP. We have been getting along so far and throughout the war with the facilities so far as machine shops are concerned and so far as ordnance repairing is concerned without the additional facilities provided by this estimate. Now, why do you regard the proposed estimate as useful? Is it vital?

Gen. MARSHALL. The Chief of Coast Artillery will have to answer that question for you. He has got this in connection with the armament that he has at these places and in connection with the facility of repairing that armament and the question is one that he will have to answer. These machine shops will all be used in connection with vocational training, also. I can go into a discussion of the subject, if you want, but this question of additional facilities is the province of the Chief of Coast Artillery and I can only give you my idea of the situation. If you want me to discuss it, I will do so from my own point of view.

Capt. RUHLEN. Mr. Slemp, if I may answer, partially. Heretofore we have had in certain coast defenses small-caliber armament, the alteration and repair of which could readily be handled in the machine shops that we had. Since the war some of the coast defenses, notably Los Angeles, have had armament installed which is greater than the capacity of the machine shops can handle. In the cases of large pieces which are required to be repaired or altered, it is sometimes necessary to ship them to the arsenals to have this work done. While those pieces are away from the coast defenses, naturally, the armament is out of commission because they are of such a nature we could not have spares, and this machine-shop enlargement is for the purpose of having all repairs of every nature made at the coast defenses, so that the guns and armament will be out of commission for the least possible time.

Mr. SLEMP. The saving in time would be simply the saving in sending the particular parts you wished to have repaired from your post to the arsenal and having them returned.

Capt. RUHLEN. Not altogether, because the arsenals have work of new manufacture always before them, and the alterations and repairs that come in have to await their turn.

Mr. SLEMP. Gen. Marshall, how much of this \$234,000 is it proposed to expend on additions to ordnance repair shops?

Gen. MARSHALL. I will insert that.

Recapitulation of projects estimated for under appropriation "Barracks and quarters, seacoast defenses, fiscal year 1920," grouping all ordnance machine shops together.

Adams, Fort, R. I., coast defense machine shop, remodeling entire interior and enlarging 21 windows-----	\$2, 700
Caswell, Fort, N. C., addition to coast defense machine shop, 20 by 20 feet, brick-----	4, 000
Crockett, Fort, Tex., addition to coast defense machine shop 20 by 20 feet brick-----	4, 000
Dupont, Fort, Del., addition to ordnance machine shop 24 by 24 feet, frame, and installing toilet facilities-----	2, 300
H. G. Wright, Fort, N. Y., remodeling coast defense machine shop and constructing addition 20 by 20 feet, brick-----	4, 200
MacArthur, Fort, Calif., addition to coast defense machine shop 18 by 20 feet, reinforced concrete walls 2 feet and 2 feet 6 inches thick--	5, 000
Moultrie, Fort, S. C., addition to coast defense machine shop 20 by 20 feet, brick-----	4, 000
Monroe, Fort, Va., addition to coast defense machine shop, brick, 40 by 20 feet, wing 17 by 21 feet-----	12, 000
Preble, Fort., Me., remodeling coast defense machine shop and addition 20 by 20 feet, brick-----	4, 000
Rosecrans, Fort, Calif., addition to coast defense machine shop 17 by 31 feet, frame-----	1, 650
Screvens, Fort, Ga., addition to coast defense machine shop, 20 by 20 feet, brick-----	4, 000
Stevens, Fort, Oreg., addition to coast defense machine shop, 15 by 14 feet, frame-----	700
Totten, Fort, N. Y., remodeling coast defense machine shop and addition 28 by 45 feet, brick-----	6, 000
Winfield Scott, Fort, Calif., additional wing to coast defense machine shop, 12 feet 9 inches by 15 feet 6 inches, brick-----	600
Worden, Fort, Wash., coast defense machine shop, 100 by 30 feet, reinforced concrete-----	10, 000
Total for coast defense machine shops-----	65, 150
Crockett, Fort, Tex., ordnance storehouse-----	37, 050
H. G. Wright, Fort, N. Y.:	
Wagon shed, 30 by 110 feet, frame-----	5, 600
Warehouse and boathouse on dock at New London-----	14, 600
Hamilton, Fort, N. Y.:	
Remodeling quartermaster office-----	8, 460
Ordnance magazine, 40 by 150 feet, reinforced concrete-----	25, 100
Warehouse for storing paints, oils, and gasoline-----	3, 150
Monroe, Fort, Va.:	
Additional story to quartermasters' office building, brick-----	7, 637
New hooster pump house, brick-----	4, 800
Wadsworth, Fort, N. Y.:	
Remodeling headquarters building-----	8, 800
New quartermaster stable, 26 by 100 feet, frame-----	10, 000
Wagon shed, 25 by 100 feet, frame-----	4, 000
Remodeling sawmill, including carpenter shop-----	2, 700
Hay shed, 40 by 75 feet, frame-----	2, 500
Ordnance repair shop, 30 by 72 feet, brick-----	6, 500
Winfield Scott, Fort, Calif., quartermaster shops, 2 buildings, 40 by 129 feet, frame-----	28, 600
Total for miscellaneous projects-----	169, 497
Grand total, barracks and quarters, seacoast defenses-----	234, 647

Mr. SLEMP. Of course, this involves the policy of whether you are going to have separate repair shops or are going to centralize them.

Gen. MARSHALL. This contemplates that each coast defense will have greater facility than they ever had before in that direction, and

that is the reason why I do not want to undertake to answer the question of policy.

Mr. SLEMP. Have we been repairing parts in the various machine shops at these various posts with the facilities we had already acquired?

Gen. MARSHALL. Only the small parts. They are not able to take care of the larger parts of the larger armaments.

Mr. SLEMP. Has it been the uniform custom to send the larger parts to the arsenals for repairing?

Gen. MARSHALL. Yes.

Mr. SLEMP. And these estimates involve a change of policy in that regard?

Gen. MARSHALL. Yes. I understand that it will be actually cheaper to do it in this way, but I am again getting out of my province and I might be mistaken. I just know that from conversation and not from personal knowledge.

Mr. SLEMP. If this appropriation for the machine shops be not allowed, will you still be able to go along and repair the smaller parts as you have done heretofore? The facilities are not diminished in any way in that respect?

Gen. MARSHALL. No, sir; they are not.

WAREHOUSE AND BOATHOUSE ON DOCKS, NEW LONDON, CONN.

Mr. SLEMP. I notice you have an item for a warehouse and boat-house on the docks at New London, \$14,600. I suppose that is for the storage of various articles to be sent there?

Gen. MARSHALL. In the New London district there are Fort H. G. Wright and Fort Terry and Fort Michie, which are all out on islands and are distant from New London. At the New London wharf they have no facilities whatever for protecting boats that may be left there and they have no facilities for housing freight and anything that is to be transported to these island posts, except a small shed which is there now and which has not sufficient capacity to take care of the normal volume of freight there. It is just left on the wharf. This money is for the purpose of providing a one-story boat-storage house and to provide a storeroom on the wharf itself for freight purposes.

Mr. SLEMP. What is the character of the building you propose, the dimensions, and so forth?

Gen. MARSHALL. Eighty by 22, corrugated iron frame building is the house to be constructed on the wharf, and the boat-storage house is one story, 20 by 40, frame and corrugated iron, the same as the warehouse.

Mr. SLEMP. There are no other facilities in that immediate neighborhood that could be utilized for this purpose?

Gen. MARSHALL. No. I have not been there for three years, but there was none there then and the information we have is that nothing has been provided since then. They simply had had to leave the things out on the dock and tie up the boats out in the open without any protection.

WAGON SHED, NEW LONDON, CONN.

Mr. SLEMP. You have an item for a wagon shed at the same place for which you ask \$5,600. Have they a good many wagons to be taken care of there?

Gen. MARSHALL. Yes, sir; they have at all those places, and this is for the housing of the transportation actually there.

Mr. OGDEN. What facilities are there now?

Gen. MARSHALL. They have a wagon shed, but it is full, and they have 10 more wagons than the shed will hold.

REMODELING QUARTERMASTER'S OFFICE, FORT HAMILTON, N. Y.

Mr. SLEMP. What have you to say in regard to this item of \$8,450 for remodeling the quartermaster's office at Fort Hamilton, N. Y.

Gen. MARSHALL. The local authorities are very insistent upon that. They insist that their quartermaster office facilities are scattered in several different buildings on the post by reason of the fact that they have not sufficient office space in any one place.

Mr. SLEMP. Does the quartermaster office come properly under this bill?

Gen. MARSHALL. All buildings of the coast defense are constructed out of this appropriation, including the buildings for officers' quarters, barracks, offices, etc.

Mr. BYRNS. I notice that you have a number of items for remodeling buildings, amounting in the aggregate to \$35,000 or \$40,000.

Gen. MARSHALL. Yes, sir. One is for remodeling and making an addition to machine shops.

Mr. BYRNS. Without calling attention to any particular one, I was wondering what was the particular necessity for remodeling the buildings during the present fiscal year, or whether these matters could not be deferred.

Gen. MARSHALL. This list I have here is made up from a list of perhaps six times what we have here. We have taken all of the requests. All of these have the approval of Chief of Coast Artillery and the local commanding officer. In conjunction with the Coast Artillery, we have agreed that it is proper and right to limit the estimate and not to go beyond a certain amount. The list presented totals this amount. This list was taken from a list containing five or six times as many items. These are the items that have been selected. For instance, the remodeling of this particular quartermaster office and the one at Fort Monroe is simply for the purpose, in the first instance, of enlarging the offices, and then, incidental to the remodeling, to put the offices in one building.

Mr. BYRNS. That is largely a matter of convenience?

Gen. MARSHALL. Yes, sir.

Mr. BYRNS. I can, of course, appreciate the fact that some necessity might arise in the matter of remodeling a machine shop or something of that sort, where you could get greater efficiency in production, etc., but in the matter of remodeling offices the question arises in my mind, because of the immense strain on the Treasury both now and during the coming year, as to whether matters of that kind could not properly be deferred for at least a year longer, or perhaps longer than that, without any particularly bad effect upon the

efficiency of the work that is being performed at the various places.

Gen. MARSHALL. It is a fact that the officers are distributed; that they are in each instance in offices devised as expedients when the post outgrew the original offices, and that the business is not conducted satisfactorily, economically, or efficiently. Of course, the balance comes in as to whether it is better to remodel the offices so that they can handle the business more efficiently and with a less number of buildings, or spend the money some other way.

Mr. BYRNS. Of course, another question arises, and that is whether or not it will cost twice as much to remodel now as it may cost later on.

Gen. MARSHALL. That is true. Building construction never in the history of the world cost as much as it does now. Whether that cost will go down again is problematical and conjectural.

Mr. SLEMP. You do not know what the attitude of this country will be in regard to the number of men that should be held at these posts or at the fortifications. The proposition comes down to the point of the suggestion that you make, that this work might, perhaps, be useful and serviceable and might contribute something to the efficiency of the conduct of the post or the business of the post—

Gen. MARSHALL. And economy.

Mr. SLEMP. Yes, and economy; but that it is not necessary or vital at all in carrying on the work of the post as it has been done in the past.

Gen. MARSHALL. No, sir. You could not point to exactly where the saving will begin that will counterbalance it. It is like any business that you have. As time goes on, you will rearrange your office and reassign your personnel, and you can not point directly to the amount of money that you save by doing it, but your judgment shows you that a saving will be accomplished. It is the difference between successful business and unsuccessful business when that judgment is applied correctly. We think we have selected the proper items here, or the ones that will give the Government the greatest return on the money invested.

Mr. SLEMP. Are any of these items at all absolutely vital to the successful running of the posts?

QUARTERMASTER STABLE, FORT WADSWORTH, N. Y.

Gen. MARSHALL. I should say that the quartermaster stable at Fort Wadsworth, N. Y., is fairly well certain to produce economy. The animals at Fort Wadsworth are in sheds and are protected with canvas, partly.

Mr. SLEMP. You refer to the item of \$10,000 for the new quartermaster stable at Fort Wadsworth, N. Y.?

Gen. MARSHALL. Yes, sir; the animals there are in sheds. The only way to protect them in the winter time is to use tarpaulins, and the tarpaulins wear out. Of course, all of this is indirect. That tarpaulin is provided in another appropriation, but the cost to the Government is there, nevertheless.

Mr. SLEMP. But even that could go on as it is now?

Gen. MARSHALL. Yes, sir; it could go on as it is now.

Col. CORBIN. I served at Fort Wadsworth four years ago, and the stables are worse than any I have ever seen anywhere else. The

animals suffer from exposure, for they are exposed to the winds blowing in from the ocean. There is an old barn that was originally on the reservation, I think, when the reservation was purchased. It is so old and dilapidated that is really a disgrace to New York Harbor. That is one item that I was particularly interested in.

Gen. MARSHALL. Take this item where we are asking for a warehouse for storing paints, oils, and gasoline. Those materials are now stored, but in every case in places where other material is stored. Those materials are highly inflammable and there is a fire risk involved. That is very pressing.

PAINT, OIL, AND GASOLINE STORAGE, FORT HAMILTON, N. Y.

Mr. SLEMP. You have an item of \$3,150 for a warehouse for storing paints, oils, and gasoline at Fort Hamilton, N. Y.?

Gen. MARSHALL. Yes, sir. Then, there is one place where there is an estimate for an extension to an ordnance machine shop.

Mr. SLEMP. Is this the only place where you have paints, oil, and gasoline stored along with other materials? What kind of building do you propose to construct with that \$3,150?

Col. CORBIN. It is to be a separate building, away for the other buildings.

QUARTERMASTER SHOP, FORT WINFIELD SCOTT.

Mr. SLEMP. At Fort Winfield Scott you have an item of \$28,600 for quartermaster shop, two buildings: That has no relation to an increase of ordnance work of any kind?

Gen. MARSHALL. No, sir.

Mr. SLEMP. What are the purposes of a quartermaster shop?

Gen. MARSHALL. That is for the carpenter, plumbers, and for the tin shop. That is for repair work about the post.

Mr. SLEMP. What facilities do you have at Fort Winfield Scott for that purpose now?

Gen. MARSHALL. We have not any specific buildings. When the new post was built, those buildings were not constructed. Just why they were not constructed I do not know, but I presume they went as far as they could with the funds in hand, and they have to use whatever space they can get for that purpose. They probably put the tin shop in some battery emplacement. I have seen that done, but whether that is the case at Fort Winfield Scott I do not know.

Mr. OGDEN. You expect to use new material in your construction work, do you not?

Gen. MARSHALL. Yes, sir.

USE OF SALVAGED BUILDING MATERIAL.

Mr. OGDEN. Now, the Government will have a good deal of material when the various camps are salvaged, and they are to be salvaged within 12 month, or at least a number of them will be, and I was wondering whether a good deal of that material could be worked into construction work like this.

Gen. MARSHALL. Yes, sir; and we are using that right along in all the construction work that we do. Wherever the material is on hand, it is used.

Mr. SLEMP. Are these estimates based upon the Government supplying the material from material that it has on hand, or upon purchasing it outright?

Gen. MARSHALL. Upon purchasing it outright. These estimates are based entirely upon the purchase of the material outright. That is due to the fact that as far as building materials are concerned, we are getting to the end of the time when we have anything except specialists. For example, we have a number of tiles down at the Norfolk base, but they are of the wrong sizes for the usual work.

Mr. SLEMP. Take the case in point, where you want to provide a quartermaster shop in a frame building. Have you any material in buildings that you constructed there during the war that could be torn down and used for this purpose?

Gen. MARSHALL. No, sir.

Mr. SLEMP. Have you any such material near that place?

Gen. MARSHALL. At Camp Fremont, the material was disposed of some time ago. It is all gone. What we have at Fort Winfield Scott, that they are using for this purpose now, is a temporary shed.

Mr. SLEMP. How long have they been using a shed there?

Gen. MARSHALL. Since the post was built, in 1912, I believe.

Mr. SLEMP. Have you had any complaint there about the character of the shop that you have now, or as to the lack of comfort or convenience in the facilities?

Gen. MARSHALL. Yes, sir; they are coming up every year, and two or three times a year. We have stacks of correspondence about them. I do not think there is an item in here, other than the ordnance repair shops, or extensions to them, that is not absolutely a recurrence when the annual estimates are sent in from the post. Many of them have been recurring for five years, at least.

Mr. SLEMP. How many men do you have employed in the shop at Fort Winfield Scott?

Gen. MARSHALL. There are five civilians employed in the quartermaster shops at Fort Winfield Scott, including a painter, carpenter, plumber, oil tender, and laborer. This number is supplemented by between 8 and 10 enlisted men as assistants in learning these trades.

Mr. SLEMP. Do they have their supplies there?

Gen. MARSHALL. Yes, sir; the supplies would be in the shop there, as well as the tools that are used.

REMODELING HEADQUARTERS BUILDING, FORT WADSWORTH, N. Y.

Mr. SLEMP. There is an item of \$8,800 for remodeling the headquarters building at Fort Wadsworth, N. Y.

Gen. MARSHALL. You are referring to an item now where the money ought to be appropriated. That building at Fort Wadsworth, when I went there in 1902, was a miserable thing, and nothing has been done to it since then.

Mr. SLEMP. What kind of building is it?

Gen. MARSHALL. It is a wooden building.

Mr. SLEMP. It is heated and lighted?

Gen. MARSHALL. Yes, sir. The floors are in a miserable condition, and the building is heated by stoves. They have electric lights. The building has settled in places, so that it is not in plumb. The floors are in an absolutely miserable condition.

Col. CORBIN. The building is about 50 years old.

Gen. MARSHALL. They have been holding up on the repairs from year to year, hoping that this year an appropriation would be made for it. Instead of trying to make any real repairs on it, they have simply made tinkering repairs, hoping that this year would be the year that it would be provided for.

Mr. SLEMP. That is one of the items about which you would be very happy if it were allowed?

Gen. MARSHALL. Yes, sir.

Mr. SLEMP. The character of the remodeling would consist of putting in new floors and new sills.

Gen. MARSHALL. Yes, sir; and the interior work would have to be attended to.

Mr. SLEMP. You would not increase the space?

Gen. MARSHALL. No, sir.

Mr. SLEMP. This is really a repair item?

Gen. MARSHALL. Yes, sir.

Mr. SLEMP. How much did you expend last year in the maintenance and repair of that particular building?

Gen. MARSHALL. I have no report of any specific amount spent on that particular building. It was simply done by the regular carpenter who is employed by the year, with material on hand. I have no record in my office of exactly the amount of time or how much material was used. It was only tinkering repairs. Only tinkering repairs have been made since I was there in 1902.

Mr. SLEMP. Have you any other items to which you would like to invite special attention?

Gen. MARSHALL. All of these items, as I said before, are important. They were culled from a very large list. It would perhaps be advisable for me to present the entire list and let the committee do the culling. We have requests from the various posts for remodeling and extensions which are without the category of ordinary repairs and maintenance, amounting to over \$1,000,000, and we have culled from those requests the ones that we present to the committee.

Mr. SLEMP. Have you taken into consideration temporary structures and facilities that might be used for these purposes?

Gen. MARSHALL. Yes, sir; in every case.

Mr. BYRNS. These items that you have submitted are those that you considered it most essential out of the number of requests that have been submitted to you?

Gen. MARSHALL. Yes, sir.

BARRACKS AND QUARTERS, SEACOAST ARTILLERY, PHILIPPINE AND
HAWAIIAN ISLANDS.

Mr. SLEMP. What is the next item you have?

Gen. MARSHALL. The next item is under "Seacoast defenses, Philippine Islands and Hawaii."

Mr. SLEMP. You are asking \$374,237.

Gen. MARSHALL. That has been reduced to \$345,300.

Mr. SLEMP. You had an appropriation of \$325,000 for this purpose in 1920?

Gen. MARSHALL. All of it is obligated. All of it is not expended, but all of it is obligated.

Mr. SLEMP. You have no balance from previous appropriations?

Gen. MARSHALL. No, sir; none whatever.

DETAILS OF ESTIMATE.

Mr. SLEMP. Will you make a statement as to these particular items? They relate to four forts—Fort Mills, Fort DeRussy, Fort Kamehameha, and Fort Ruger.

SALT-WATER SYSTEM, FORT MILLS, P. I.

Gen. MARSHALL. The first item there is \$230,100 for Fort Mills. That includes an item of \$100,600 for a salt-water system. The necessity for that is that the water supply on Corregidor Island is very limited. They have a water ration there. The Philippine Islands, as we all know, is in the Tropics. They have a water ration there now of only three hours per day. In other words; there are only three hours during the day that water is turned on. That is due to the fact that the fresh-water supply on the island is so limited that they have not enough to go around. It has been in contemplation for 10 years, to my knowledge, to put a salt-water system in there so that they can use salt water for toilet purposes and not have a three-hour day supply for those purposes as they have now.

Mr. SLEMP. Of course, you have a reservoir there now?

Gen. MARSHALL. Yes, sir.

Mr. SLEMP. Do you fill the reservoir during those three hours?

Gen. MARSHALL. Yes, sir; but there is not sufficient capacity. The water tanks have not sufficient capacity and there is not enough water to supply them. They bring in water now by water boats.

Mr. SLEMP. Is this item in relation to the sewers and water for fire protection?

Gen. MARSHALL. Yes, sir; for the sewers and for fire protection. There is no fire protection now except when the reservoir happens to be full.

Mr. SLEMP. You have a fire department?

Gen. MARSHALL. Yes, sir. It is proposed to put in two 200,000-gallon tanks and to have the proper distribution piping so that this will afford fire protection.

Mr. SLEMP. You pump the water into the tanks?

Gen. MARSHALL. Yes, sir.

Mr. SLEMP. And you would, through the main pipes, connect that up with the present sewerage and toilet facilities?

Gen. MARSHALL. Yes, sir. I can say that that is something that in common decency is necessary.

Mr. SLEMP. How many people have you on that island?

Gen. MARSHALL. Five thousand seven hundred and seventy-seven.

Mr. SLEMP. Men, women, and children?

Gen. MARSHALL. No, sir; that is the garrison, and in addition to that the women and children. Just how many there are of women and children I do not know. This is simply the garrison of officers and enlisted men. I suppose there are 6,500 or 7,000 people on the island.

Mr. SLEMP. Is this island owned exclusively by the United States for defense purposes?

Gen. MARSHALL. I am not sure about that, but I think so.

Mr. SLEMP. What I am trying to get at is whether there are any commercial interests on the island.

Capt. RUHLEN. It is entirely Government property.

Mr. SLEMP. There is no commercial organization there that furnishes water either to the civilian population or the Government reservation in any way at all?

Gen. MARSHALL. No, sir.

Mr. SLEMP. The water you get now is from artesian wells?

Gen. MARSHALL. Yes, sir; supplemented by water brought in by water boats.

We can not get the water. It is not there. The water they get is surface water, or it is water floating on top of the salt water. There is no artesian water there in the sense of a deep stratum. It is local water that falls on the island, or over the area of the island itself.

Mr. SLEMP. What is your next item?

CONCRETE LORCHA DOCK, FORT MILLS, P. I.

Gen. MARSHALL. The next item is a concrete lorcha dock at Fort Mills, \$90,000. They represent that they have never had enough wharf facilities, and this matter has been up for a number of years. In my judgment, this, perhaps, comes within the category of what we have been discussing as desirable, but it is not an absolute necessity.

Mr. SLEMP. How many docks and wharves have they?

Col. CORBIN. There are two that they can use now.

Gen. MARSHALL. They have two.

Mr. SLEMP. One for the Quartermaster Department and one for the Engineers?

Gen. MARSHALL. Yes, sir; one is for the mine planters and the other is for the Quartermaster Department. They have complained repeatedly about the fact that they have not enough wharf facilities to handle the barges and other vessels at present, that vessels are compelled to wait in the harbor until docking space is available. That is the constant situation confronting them.

Mr. SLEMP. The engineering department presents an estimate of \$75,000 for the construction of a concrete wharf in place of the wooden one they have. Would not that, with the quartermaster dock—

Gen. MARSHALL (interposing). That would give them no more capacity—that is, just to change the type of the wharf.

Mr. SLEMP. The old wharf seems to be a ramshackle wharf, and they do not use it to its maximum capacity.

Gen. MARSHALL. From the reports we have it is used to its capacity continually, even though it is in that condition. So far as additional capacity is concerned they have been getting on with that dock for some years, although it is expensive to do so. If you keep transportation waiting like that it costs money.

Mr. SLEMP. Would a new dock be cheaper than to enlarge or lengthen the existing dock?

Gen. MARSHALL. Yes; this construction would be cheaper. You see, this is right alongside of the sea wall and we would build the dock right over it.

Mr. SLEMP. A concrete dock?

Gen. MARSHALL. Yes. Of course, concrete is not cheaper than wood, but it is permanent.

Mr. SLEMP. If you take away the quartermaster's work and the engineer's work, what would this dock be used for?

Gen. MARSHALL. It would be used for all the transportation facilities of the island, because they have there an island of 7,000 people.

Mr. SLEMP. All the quartermaster's supplies would come over the quartermaster dock and all of the engineer supplies would come over the engineer dock; and that being so, what other supplies would be handled?

Gen. MARSHALL. This is just to make a larger quartermaster dock; that is what it is, increasing the quartermaster dock facilities.

ELECTRIC HOIST CABLEWAY, CORREGIDOR ISLAND.

Mr. SLEMP. Go to your next item?

Gen. MARSHALL. The next item is the electric hoist cableway. Corregidor Island is very steep and very high. They have two systems of getting material up to the top; one is with an electric railway line and the other one is this cable hoist. This cable hoist, as installed, has grades as high as 37 per cent on it, and it has three very bad curves in it. It has come to a point where it is about worn out; it came to that point five years ago.

Mr. SLEMP. Would it last another year?

Gen. MARSHALL. I think it will last another year, with repairs, but it is in constant jeopardy of a complete breakdown. Conditions on Corregidor Island necessitate two methods of carrying supplies up.

Mr. SLEMP. You can take them up by this electric tramway and this electric hoist?

Gen. MARSHALL. Yes, sir.

CONCRETE WATER TANK FOR CENTRAL POWER PLANT, CORREGIDOR ISLAND.

Mr. SLEMP. The next item is for reenforced concrete water tank for the central power plant?

Gen. MARSHALL. That is very necessary. The water we bring to the island is good for the power plant and it does not hurt the boilers, but the water we get on the island has a certain content in it that destroys the boilers very rapidly, so that this tank is simply a question of economy.

Mr. SLEMP. What is the next item?

FAMILY QUARTERS FOR MACHINISTS, CORREGIDOR ISLAND.

Gen. MARSHALL. Four sets of family quarters for ordnance machinists. These ordnance machinists at present come down from Manila to do their work and their transportation covers about four or five hours a day coming and going, so that the amount of work they get done is fairly limited, because there is no building on the island for them to live in. This is to provide facilities for those machinists, who are very necessary.

Mr. SLEMP. What portion of the year would these quarters be occupied?

Gen. MARSHALL. All the year.

Mr. SLEMP. You mean you would keep them there all the time?

Gen. MARSHALL. Yes; these machinists are employed all the time on Corregidor Island.

Mr. SLEMP. Do we furnish them housing facilities at Manila?

Gen. MARSHALL. I can not answer that question, but I think not. Ordnance machinists off a reservation are not furnished with quarters.

Mr. SLEMP. The idea is to save their time?

Gen. MARSHALL. Yes, sir.

Mr. SLEMP. Would they pay rent for these quarters?

Gen. MARSHALL. No; it is just a question of advantage to the Government.

Mr. SLEMP. Do I understand that with an eight-hour day they get about three hours' work from them?

Gen. MARSHALL. They get between three and four hours' work.

Mr. SLEMP. And five hours' transportation?

Gen. MARSHALL. Yes, sir.

Mr. SLEMP. How many machinists have you who would operate under that system?

Gen. MARSHALL. There are five at that place, and I think that is the only place where conditions are so. I know of no other place where it happens. The armament is there and it requires so many machinists to keep it up, but they are not able to keep it up under present conditions.

FORT DE RUSSY PROJECT.

Mr. SLEMP. What is to be done at Fort De Russy?

Gen. MARSHALL. The first item is for a mechanics' shop.

Mr. SLEMP. The total for Fort De Russy is \$29,437?

Gen. MARSHALL. No; \$12,150.

Mr. SLEMP. You have reduced it to that amount?

Gen. MARSHALL. Yes, sir.

Mr. SLEMP. You propose to do some work on sidewalks and sewers?

Gen. MARSHALL. Those are incidents to the other work; the roads, walks, and sewers are incidents to the construction of the mechanics' shop; it is proposed to extend the roads to the mechanics' shop and the quartermaster storeroom and office building, as well as install toilet facilities.

Mr. SLEMP. Have you a quartermaster storeroom there now?

Gen. MARSHALL. No; they have one room for the quartermaster which is completely filled, that is, the present quartermaster storeroom is a room in the headquarters building that was not intended for that purpose; the headquarters building was constructed as a headquarters building and no quartermaster storeroom was provided, because, I presume, the amount of funds available would not permit of any more buildings. So a room in the headquarters building, that was intended for other purposes, is being used for quartermaster purposes.

Mr. SLEMP. Do you need the room in the headquarters building for other purposes?

Gen. MARSHALL. Yes, sir.

Mr. SLEMP. For what purposes?

Gen. MARSHALL. For headquarters purposes. You see, Fort De Russy has grown to about the capacity originally intended for it.

Mr. SLEMP. How many men do you have there?

Gen. MARSHALL. Two hundred and thirty-nine.

Mr. SLEMP. It would not take a very large building to accommodate the quartermaster's needs?

Gen. MARSHALL. Thirty by one hundred and forty is the size of the building, corrugated iron walls and concrete floors; that is the type of the building.

Mr. SLEMP. If this were not granted by the committee or Congress, then the sidewalks, sewers, electric lighting conduits, etc., would be eliminated?

CORRAL, FORT DE RUSSY.

Gen. MARSHALL. They would be eliminated, as they are incidents to these buildings. The corral at Fort De Russy is too small for the number of animals they have. It was built of wire mesh rather than of the standard pipe rails and posts; it was put up as a temporary affair and has been continued from year to year as a temporary affair for want of appropriations. We have had repeated reports that the horses slip their feet through this wire mesh, injuring their legs and hoofs. They want to construct a standard corral so that the animals may be properly cared for.

Mr. SLEMP. The amount of that is \$1,000?

Gen. MARSHALL. Yes, sir.

Mr. SLEMP. What is your next item?

FORT KAMEHAMEHA—ADDITIONAL BARRACKS.

Gen. MARSHALL. The next item is for Fort Kamehameha. The necessity for additional barracks capacity should be presented to you by the Chief of Coast Artillery. As I understand, they propose to send men there in the immediate future, and the additional barrack capacity grows out of that, according to the reports we have.

Mr. SLEMP. This whole matter of \$91,500 is an incident to the construction of two barracks?

Gen. MARSHALL. The two barracks are, but the garage is not. A garage is needed because at the present time they have no place for taking care of motor vehicles, those vehicles being stored in the open.

Mr. SLEMP. Would this garage take care of the motorized artillery?

RESURFACING ROADS, FORT KAMEHAMEHA.

Gen. MARSHALL. This garage would hardly be large enough for that. The extensions to the utilities there are made necessary by the barracks. They propose to surface the roads with tarvia macadam.

Mr. SLEMP. Are they new roads?

Gen. MARSHALL. No; the present roads are in very bad condition. The character of their top surfacing is coral, which has gone to pieces.

Mr. SLEMP. Have you any other funds from which you can get a maintenance item for roads?

Gen. MARSHALL. Not at a seacoast post.

Mr. SLEMP. This is road construction, and I am trying to differentiate between construction and maintenance. This item is a maintenance item.

Gen. MARSHALL. For minor repairs, yes; but when a thing gets to the point of needing replacement we always consider it new construction.

Mr. SLEMP. Where do you get your money for the maintenance and repair of roads?

Gen. MARSHALL. Out of the regular appropriation for the construction and repair of roads, walks, wharves, and drainage.

Mr. SLEMP. Have you asked for any money for this purpose in the Army bill?

Gen. MARSHALL. No.

Mr. SLEMP. How long is this particular road?

Gen. MARSHALL. About 2½ miles.

Mr. SLEMP. When was it built?

Gen. MARSHALL. It was built when Kamehameha was built, which, I should think, was in 1912.

Mr. SLEMP. Have you spent much money on its upkeep since?

Gen. MARSHALL. No; just the regular maintenance force that we have.

Mr. SLEMP. That is just an ordinary macadam road that needs resurfacing?

Gen. MARSHALL. Yes. The material they have there (coral) pulverizes under the transportation they have. It produces also a very great dust nuisance, of which they complain. They want to put a surface on the road that will not have that effect.

Mr. SLEMP. Would you have to import the surfacing?

Gen. MARSHALL. Not the rock part of it, but the bituminous part.

Capt. RUHLEN. The new battery which has been constructed is a considerable distance from the post, and the road which has heretofore been used would not be suitable. Whenever it rains the road becomes very muddy and very glassy, so that no vehicles can remain on it.

Mr. SLEMP. How many men do you propose to take over there under your new plans?

Capt. RUHLEN. About 280 men.

Mr. SLEMP. Will you need any other facilities at the post besides the barracks?

Capt. RUHLEN. No other facilities than those that have been estimated for.

Mr. SLEMP. What is the next item?

CORRAL, FORT RUGER, P. I.

Gen. MARSHALL. Fort Ruger is the next item. There we have no corral. At Fort Ruger they have 32 animals, and they want to build the standard corral.

Mr. SLEMP. Where do you keep them now?

Gen. MARSHALL. They have to tie them up and keep them in the stables; they can not turn them loose.

Mr. SLEMP. What you want is a pasture?

Gen. MARSHALL. This is not a pasture; it is just so the animals can have a running place. There is no grass there for them to eat. It is just to build a pipe fence, an inclosure 125 by 125, which is the standard corral we build at a place like this, so that they can turn the animals loose in there.

Mr. SLEMP. In view of the motorization of artillery of all kinds, are you not going to displace horses?

Gen. MARSHALL. That has not been the result as yet.

Mr. SLEMP. Is there anything else at that place?

PAINT AND OIL STORAGE, FORT RUGER, P. I.

Gen. MARSHALL. Then there is a storehouse for paints, oils, etc. We have no storehouse there now, the paints, oils, etc., being stored wherever we can find available space, so that there is always a question of a fire hazard.

Mr. SLEMP. This will not be a large building; it will be 20 by 20?

ADDITION TO QUARTERMASTER STOREHOUSE, FORT RUGER.

Gen. MARSHALL. Yes; it is a small place. Then there is an addition to the quartermaster storehouse.

Mr. SLEMP. The estimate for that being \$4,000?

Gen. MARSHALL. Yes. It will be a corrugated iron building, the same as the others. The present storehouse is 16 by 100, and the space provided is entirely inadequate for the necessary storage of quartermaster supplies.

Mr. OGDEN. This would enlarge the building how much?

Gen. MARSHALL. It would enlarge it 30 by 50.

Mr. SLEMP. When was Fort Ruger built?

Gen. MARSHALL. I think it was built in 1910.

Mr. SLEMP. You have been getting along with the present facilities up to date, have you not?

Gen. MARSHALL. No; they have not been getting along well at all. It is just like all of those places, where you go as far as the money will permit you to.

Mr. SLEMP. Is it intended to put a larger number of men at Fort Ruger than the number there at present?

Capt. RUHLEN. The garrison has been enlarged.

Mr. SLEMP. When was it enlarged?

Capt. RUHLEN. Within the last two years.

Mr. SLEMP. How much?

Capt. RUHLEN. By two companies.

Gen. MARSHALL. There are four companies there now, and I think the original post was a two-company post. The quartermaster storehouse was built upon that basis. They actually have to leave things out of doors. That is what they have to do now and is just a plain statement of fact. They have not room enough for them anywhere else.

Mr. SLEMP. Do you have general quartermaster supply facilities anywhere on the islands which would correspond to a wholesale house from which you distribute to the various posts?

Gen. MARSHALL. Yes, sir.

Mr. SLEMP. Have you taken that into consideration?

Gen. MARSHALL. The size of our storehouses at these different places is based upon that, of course.

Mr. SLEMP. That is located at Honolulu, I suppose?

Gen. MARSHALL. Yes, sir.

FIRE STATION, FORT RUGER.

Mr. SLEMP. What about the fire station?

Gen. MARSHALL. There are two pieces of fire apparatus on the post—a Howe-Ford pump engine and a hand-drawn ladder truck. This apparatus is sheltered by taking it from place to place, that shelter being taken for other purposes as needed. A fire station has never been constructed there. Fort Ruger is located so that it is fairly close to Honolulu, and the Honolulu fire department is available to it, but, of course, is not available to it as quickly as the apparatus we have right at the post.

Mr. OGDEN. What is the distance between the two places?

Gen. MARSHALL. Fort Ruger is just at the edge of the city.

Mr. SLEMP. With this \$3,000 you would expect to construct the building and install the apparatus?

Gen. MARSHALL. We have the apparatus there.

Mr. SLEMP. Where do you keep it now?

Gen. MARSHALL. It is moved from place to place. It is kept under a shed or in the storehouse. It has no permanent home.

Mr. SLEMP. You do not have the fire organization living with it?

Gen. MARSHALL. No; it is just simply changed from place to place.

Mr. SLEMP. Is it proposed to have sleeping quarters for the fire organization?

Gen. MARSHALL. No; not at a small place like that. The engineer of the engine sleeps in the barracks nearest to its station.

Mr. OGDEN. How is this engine drawn?

Gen. MARSHALL. It is an automobile.

Mr. SLEMP. You have been getting along pretty well with it, have you not?

Gen. MARSHALL. Yes; but it is just a question of time when it will have no home at all, because, as it is now, they have been putting it here, there, and yonder; sometimes in the stable or under a shed or leaving it out in the open and covering it with tarpaulin.

ROADS, WALKS, SEWERS, ETC., FORT RUGER.

Mr. SLEMP. The next item is for roads, walks, sewers, water lines, and electric-light line extensions?

Gen. MARSHALL. Yes, sir.

Mr. SLEMP. All of those items are incident to the facilities you are asking?

Gen. MARSHALL. Yes; they are incidents to these other facilities.

Mr. SLEMP. Could you locate the roads in such a way as not to require \$12,000 for them?

Gen. MARSHALL. The amount is not \$12,000 but \$1,350. Day before yesterday, when I was going over this, I cut the amount to \$1,350.

Mr. OGDEN. In constructing these various buildings, is it the purpose to construct them with a capacity to take care of the present needs?

Gen. MARSHALL. Yes.

Mr. OGDEN. You do not construct them to take care of any additional needs that might arise in the years to come?

Gen. MARSHALL. If the General Staff says, "We are going to build this much now and it is going to be increased," then we plan a structure that will ultimately have a capacity for the ultimate needs, but if the character is such that you do not need to do that, we build for the present capacity. So far as I know, there is no present thought of any increased need there.

Mr. SLEMP. Your electric-light line extensions would be an incident to the other facilities?

Gen. MARSHALL. Yes, sir.

BARRACKS AND QUARTERS, PANAMA CANAL.

Mr. SLEMP. The next item is for barracks and quarters at Panama, for which you ask \$96,500?

Gen. MARSHALL. That amount is reduced to \$81,000.

Mr. SLEMP. Last year you had an appropriation for \$4,161,849. Will you kindly state the condition of your balances?

Gen. MARSHALL. That goes to the other part of this bill and is not included in this part. You see, there were two parts to this bill; one came to the fortifications committee and the other went to the sundry civil committee.

Mr. SLEMP. And, as I understand, hearings have already been had in that connection?

Gen. MARSHALL. Yes, sir.

Mr. SLEMP. And you have no money in hand?

FORT AMADOR IMPROVEMENTS.

Gen. MARSHALL. No; no money at all.

At Fort Amador there is to be a fire-engine house, a garage, and surface drainage. The surface-drainage condition is this, that the surface drainage ends right at the head of a swale, like this [indicating], and along here are the officers' quarters, and the water coming from this surface drain flows into this swale and produces a mosquito harbor. The extension is necessary both from a sanitary point of view and to protect that property. To extend this drain until its end is in the ocean is what this item of \$3,500 is for.

Mr. BYRNS. Where is Fort Amador?

Gen. MARSHALL. It is on the Pacific side. The fire apparatus at Fort Amador is now kept at one end of the quartermaster storehouse. This storehouse is needed for its normal purposes, and the consequence is that it is proposed to build a fire house there of the same type of construction as the other building.

Mr. SLEMP. Your surface drainage will cost \$3,500 and your engine house how much?

Gen. MARSHALL. \$7,000.

Mr. SLEMP. And the garage?

Gen. MARSHALL. \$2,000.

Mr. SLEMP. Have you any garage there now?

Gen. MARSHALL. No, sir.

Mr. SLEMP. Do you need one?

Gen. MARSHALL. Yes, sir; the motor vehicles are not under any cover whatever.

Mr. SLEMP. Your gas meter and main items, which are large——

Gen. MARSHALL (interposing). They are cut out.

ORDNANCE REPAIR SHOPS, FORT AMADOR.

Mr. SLEMP. Then, you have an item for ordnance repair shops, \$14,000. You are asking for an extension of the ordnance repair shops?

Gen. MARSHALL. As I say, that is a policy of the Chief of Coast Artillery, but this is outside of that policy. The following machinery is on its way or has been ordered there: One 9-foot planer; one No. 3 milling machine; one 5-foot radial drill; one 16-inch lathe; one 6-horsepower air compressor, with electric motor (portable); one 2-horsepower air drill; one air hammer; one high-speed air drill; one cutting and welding outfit, portable, acetylene or electric; one emery wheel stand, complete with covers, shield, etc., for two 12-inch emery wheels; one meger; one sensitive upright drill, complete; one speeder, gasoline, two-cylinder, standard gauge; one small rivet lathe.

The present equipment of the ordnance storehouse and machine shop at Fort Grant is entirely inadequate for the installation, repair, and upkeep of the ordnance material of the coast defenses of Balboa, which it is intended that it should do. That it may be able to care for all repairs promptly, it is necessary that this additional machinery, which is being sent or will be sent, be set up and made available for use immediately. There is no room whatever available in the present building in which to do this.

The main storeroom, which with the machine shop occupies the present building, is overcrowded at present, necessitating storage of some materials out of doors and under the building. The latter place is very damp at all times and is wholly unsuited for such purposes. The second floor of the proposed extension will provide additional storage space required to care for the necessary supplies, and the first floor will provide the required space for installing the additional machinery mentioned above. From the point of view of both the storage space and the machine-shop space required, this addition is necessary.

This machinery is on its way there for the repair of the artillery on the Pacific end of the canal.

Mr. SLEMP. Have you no place to store that?

Gen. MARSHALL. There is no place available for it whatever, and unless this ordnance machine shop is provided that machinery can not be used.

Mr. SLEMP. How far would you be from another machine shop at some other post?

Gen. MARSHALL. They have not this capacity anywhere on the Canal Zone. They only have the small installations that they had there before the war.

Mr. SLEMP. Is this to be a central repair shop?

Gen. MARSHALL. For the coast defense at Balboa, yes; for the Pacific side.

Mr. SLEMP. You propose to have a central repair shop—one on the Pacific side and one on the Atlantic side?

Gen. MARSHALL. The Chief of Coast Artillery has not advised us about that.

ORDNANCE MACHINE SHOP, FORT RANDOLPH.

Mr. SLEMP. I notice you have an item of \$35,000 for an ordnance machine shop at Fort Randolph.

Gen. MARSHALL. That is a combination artillery-engineer-ordnance matter.

Mr. SLEMP. General, is it not possible to consolidate the repair work at Panama at one place?

Gen. MARSHALL. I can not answer that. That is the operating end of the Artillery. They say this is the proper disposition and for us to estimate for the building. Whether it is possible for the Artillery to set up the machinery, and so forth, for all of their repairs on the Pacific and have none on the Atlantic or at some place in between, as Chief of the Construction Division I am not qualified to answer. That is somebody else's policy.

CONSTRUCTION OF ROADS, FORT RANDOLPH.

Mr. SLEMP. Have you cut out the item for the construction of roads at Fort Randolph?

Gen. MARSHALL. No, sir; that is to connect the batteries, and the Artillery wants those roads very badly.

Mr. SLEMP. How much road construction is involved there?

Gen. MARSHALL. That is a 16-foot road, 3,660 feet long, and it is estimated to cost \$19,500.

Mr. SLEMP. What character of construction?

Gen. MARSHALL. That is to be a concrete road between the batteries.

Col. CORBIN. All the roads down there are of concrete. No other type of road will stand the heavy rains down there.

Gen. MARSHALL. The artillery want that road very much.

Mr. SLEMP. What kind of road have they now?

Gen. MARSHALL. Just a dirt road or trail.

Mr. SLEMP. What do you have to carry between the batteries?

Gen. MARSHALL. There is constant communication between them, ammunition or the matériel of the battery, and everything that goes to the battery goes over these roads, and the troops march back and forth.

Mr. SLEMP. You would not need a concrete road for the troops to march on.

Gen. MARSHALL. You do not need a concrete road; no. But it is better to put in a concrete road because the rains attack the other types of roads so savagely that it is a question of economy to put in concrete roads.

Mr. SLEMP. Is the construction work at Panama under your jurisdiction or under the Isthmian Canal Commission?

Gen. MARSHALL. Under the Isthmian Canal Commission.

Mr. SLEMP. And you represent that commission here in presenting this?

Gen. MARSHALL. Yes.

Mr. SLEMP. Based upon written reports sent to your office?

Gen. MARSHALL. Yes; I present it from those reports. I digest the reports and present it to you as best I can.

Mr. SLEMP. With reference to the ordnance facilities at Fort Randolph, is this an entirely new construction item of \$35,000?

Gen. MARSHALL. Yes, sir; that is a new building.

Mr. SLEMP. Have you any ordnance shop buildings there now?

Gen. MARSHALL. I can not answer the question positively, but apparently there is no ordnance repair shop there.

Mr. SLEMP. Where are those repairs being made?

Gen. MARSHALL. I can not answer that. They have a frame storehouse which is used as an artillery, engineer, and ordnance office.

Col. SHERRILL. I am familiar with the Panama Canal and they have none there, but they have one for the ordnance themselves at Corozal, but not for the artillery.

Mr. SLEMP. At what point have you been making your ordnance repairs?

Col. SHERRILL. That I could not say.

Mr. SLEMP. Gen. Marshall, will you put a statement about that in the record?

Gen. MARSHALL. Yes.

FORT RANDOLPH, CANAL ZONE—MACHINE SHOP, ORDNANCE STOREROOM, AND ARTILLERY ENGINEERS' ELECTRICAL SHOP.

The building proposed herewith will provide adequate and approved facilities for the ordnance machine shop, ordnance storeroom, Artillery engineers' electrical shop, office, and storeroom. Constructed of reinforced concrete and located directly in the rear of a parapet, this building will be protected from the major part of a hostile fire and will provide such protection for the machinery as to continue it in working order during even intense and continued bombardments. It must be remembered that the proper functioning of the ordnance machine shop is absolutely essential to the maintenance of the armament of the fort in time of hostilities that any damage or destruction to it will result in silencing the batteries of the fort much sooner than could be done by hostile fire alone. This building is extremely necessary and should be by all means authorized at once.

The equipment of the present ordnance repair shop at this post consists of only one lathe and one drill, this being all the available floor space will permit. The total armament which must be kept in repair at this fort consists of two 14-inch guns, eight 12-inch mortars, four 6-inch guns, six 4.7-inch guns, and two 3-inch guns, together with an assortment of machine guns, caliber guns, range finders, depression finders, etc. In addition the major repair items from Fort Sherman will be done at this shop, Fort Sherman having equipment for doing only the smaller items of repair. The lack of machinery at the fort necessitates the sending of all but the most minor repairs to the shops at Cristobal on the Atlantic side of the canal. The poor condition of the roads from the fort to Colon makes shipment by water necessary, thus causing long delays and great expense.

In the near future there will be extensive modifications made to the 14-inch guns. It is earnestly desired that an ordnance machine shop may be constructed immediately so that this work can be done in that shop, as to do so will result in a very considerable saving of money to the Government. The same modification is at present being made on the Pacific side of the canal in the ordnance machine shop at Fort Grant. The cost of this work at Fort Grant shows a saving of from 70 to 80 per cent on some items, as compared

with quotations for the same work from the Panama Canal shops. The reason for the large saving is the tremendous overhead expenses at the Panama Canal shops. An estimate of the cost of the work which it is desired to do at Fort Randolph on this one item of modification of the 14-inch guns received from the Panama Canal shops is \$2,000 per gun. The armament foreman at the ordnance repair shops estimates that he could do the same work if machinery were available for \$1,200, showing a saving of \$800, or 40 per cent, per gun to the Government on this one item.

Recently a large part of the trained personnel of the Coast Artillery Corps has been taken away from the canal, leaving vacancies which must be filled by recruits. During the period before these recruits become thoroughly familiar with the armament there will be many more repairs than ordinarily. This renders the need for an ordnance machine shop at the Atlantic side of the canal more acute than ever. It must be kept in mind that as a measure of defense it is almost as important that a fully equipped repair shop be available in the immediate vicinity of the guns themselves as it is that the guns be there.

BARRACKS AND QUARTERS, FORT SHERMAN.

Mr. SLEMP. General, in the bill of last year you had an item of \$140,000 for the construction of barracks, quarters, and other necessary buildings for Coast Artillery troops at Fort Sherman, including water and sewer systems, roads, walks, etc. How are you getting along with that construction?

Gen. MARSHALL. We have no report on that at all.

Mr. SLEMP. You are not asking for any money for that purpose this year, and I suppose they have enough money on hand.

Gen. MARSHALL. Yes, sir.

Col. CORBIN. Gen. Kennedy, when he was here before the sundry civil committee, made the statement that the construction there would be approximately completed on June 30, using up the entire amount appropriated last year.

Mr. SLEMP. And making the construction within the appropriation?

Col. CORBIN. Approximately so.

Mr. BRYNS. I believe he made the same statement with reference to the wharf at Fort Sherman.

WEDNESDAY, MARCH 24, 1920.

INSTALLATION AND REPLACEMENT OF ELECTRIC LIGHT AND POWER PLANTS IN UNITED STATES.

Col. SHERRILL. Mr. Chairman, referring to the item on page 34 for the installation and replacement of electric light and power plants at seacoast fortifications of the United States, I would like to submit the following communication from the Chief of Engineers to the chairman of this committee:

TECHNICAL EMPLOYEES.

MARCH 24, 1920.

CHAIRMAN APPROPRIATIONS COMMITTEE,

House of Representatives, Washington, D. C.

SIR: 1. The Army appropriation act approved July 11, 1919, contains the following proviso:

"*Provided*, That the services of skilled draftsmen, civil engineers, and such other services as the Secretary of War may deem necessary, may be employed.

only in the office of the Chief of Engineers to carry into effect the various appropriations for 'Engineer equipment of troops,' 'Engineer operations in the field,' and other military appropriations, to be paid from such appropriations: *Provided further*, That the expenditures on this account for the fiscal year 1920 shall not exceed \$225,000. The Secretary of War shall each year, in the annual estimates, report to Congress the number of persons who are employed, their duties, and amount paid to each."

This proviso was inserted in the act in order to provide for the supply section and for the procurement and development section of the Chief of Engineers office, which had, previous to the war, been carried on as a field activity at the Engineer depot at Washington Barracks, D. C. Upon the outbreak of the war this office was multiplied many times, and it was necessary to move it to larger quarters at 1438 U Street NW., Washington, D. C. In this location it was so expanded as to be able to care for the procurement of all Engineer material used during the war, with the exception of that pertaining to port terminal and railway construction and operation. In the course of expansion there was established a section of the Engineer depot for the purpose of investigating and developing new types of Engineer equipment, including the development of sound and flash ranging devices and of searchlights for both mobile army and seacoast defense.

2. To effect the procurement of port terminal and railway material, and also to procure and organize the personnel for these operations, a second field office was instituted under Mr. S. M. Felton, president of the Chicago Great Western Railroad, who was given the title of Director General of Military Railways.

This office was also maintained through field operations of the Engineer Department at large. When consolidation of procurement under the Purchase, Storage and Traffic Division, General Staff, was made effective, the larger portion of the procuring facilities of the engineer depot was transferred to the Director of Purchase; the smaller portion, including the section dealing with the development of searchlights, sound and flash ranging, and engineer equipment, remained under the control of the Chief of Engineers and was moved into the same building as the Office of the Chief of Engineers at Seventh and B Streets. Thus there came to be housed in the same building with the Office of the Chief of Engineers two field offices of the Engineer department at large whose activities were intimately connected with the Office of the Chief of Engineers.

3. In order to meet these conditions the above proviso was included in the Army act of July 11, 1919. This authorization involved no additional expenditure of funds, the effect of the proviso being merely to place in the Office of the Chief of Engineers and to maintain in that status from field funds organizations which would otherwise have to be maintained in the field from the same appropriations under much less advantageous administrative control. The language of this proviso is similar to that in previous Army appropriation acts in connection with the Ordnance and Signal appropriations.

4. It is requested that this proviso be inserted in the fortification act in order to permit the continuation of the essential technical work connected with supply, procurement, and development with which the Chief of Engineers is now charged, which functions will be seriously handicapped by a proviso that has been included in the legislative, executive, and judicial bill recently passed by the House of Representatives, which reads as follows:

"Provided further, That appropriations contained in any other act for the fiscal year 1921 shall not be used for the payment of civilian personnel in the bureaus or offices of the War Department in the District of Columbia."

5. Except for these development functions, the Office of the Chief of Engineers is on a prewar status as to number of employees. This applies to the sections of civil works, finance, and general administration.

Very respectfully,

LANSING H. BEACH,
Major General, Chief of Engineers.
By MASON M. PATRICK,
Colonel, Corps of Engineers.

(The proviso referred to in paragraph 4 above is as follows:)

Provided, That the services of skilled draftsmen, civil engineers, and such other services as the Secretary of War may deem necessary may be employed only in the office of the Chief of Engineers to carry into effect the various appropriations for "Engineer equipment of troops," "Engineer operations in

the field," and other military appropriations, to be paid from such appropriations: *Provided further*, That the expenditures on this account for the fiscal year 1921 shall not exceed \$225,000. The Secretary of War shall each year, in the annual estimates, report to Congress the number of persons who are employed, their duties, and amount paid to each, and the legislative, executive, and judicial act for fiscal year 1921 is amended accordingly.

It was stated yesterday that this development section of the Chief of Engineers' office was in a prewar status, and that the proviso in the legislative, executive, and judicial appropriation bill would destroy the development section of the Chief of Engineer's office, or else force it down to a point where we could not function economically.

The CHAIRMAN. What do you mean by the development section?

Col. SHERRILL. That is a section that develops improved searchlights, improved types of towers, and it is the one that developed the tractor mounts that have been referred to. They get up detailed plans for the different types of towers. For instance, in the section that I have charge of we have a great many steel towers to build at stations, and we can save a large sum of money by having them standardized. We can save money by having all steel construction standardized, and whatever else we order in large quantities. If we do not do that every district officer would have to draw plans for particular types of towers; perhaps making little modifications, that would not only consume an enormous amount of time, but would prevent production on anything like a quantity basis.

Mr. SLEMP. Does the work of your development section pertain to the development of facilities used in connection with searchlights?

Col. SHERRILL. It covers everything.

Mr. SLEMP. In the entire Engineer Department?

Col. SHERRILL. Yes, sir; in the whole Engineer Department. For instance, we are now developing a new type of pontoon bridge that will carry our heavy tractors and trucks. In that connection, each particular job is paid for out of the appropriation made by Congress for that particular work. The appropriation is made somewhere else for the work, and it involves no appropriation here. For instance, this development work on searchlights would be paid for out of this item for searchlights. I think this provision should be incorporated in the bill. It does not appropriate anything. The Chief of Engineers wishes to make it perfectly clear that it is not intended to keep his department on any expanded war basis. It is less than the Engineer Depot was before the war. There is no expansion at all.

Mr. SLEMP. Referring to the \$50,000 asked for technical services for development purposes, is anything to be asked for the same purpose in the Army bill or the legislative, executive, and judicial appropriation bill?

Col. SHERRILL. No, sir.

Mr. SLEMP. For the payment of offices and employees?

Col. SHERRILL. No, sir; no money that is not asked for in connection with a specific job, as, for instance, in the case of these tractors, we will authorize the purchase of those tractors and the development of the details of them would have to be paid for out of that money. That is covered in the estimates for the tractors.

Mr. SLEMP. I want something in the record explaining why you say that it shall not exceed \$225,000.

Col. SHERRILL. We asked \$400,000 for this purpose last year, and the committee gave us in the Army act \$225,000.

Mr. SLEMP. Will you insert in the record a brief statement covering the expenditure of the \$225,000?

Col. SHERRILL. Yes, sir. We are not by any means expending that total sum. The expenditures this year, I think, will be found to be not over \$100,000; but it was authorized so that we would not be handicapped if we wanted to develop something. The total expenditure from August, 1919, up to and including February 29, 1920, under the \$225,000 proviso, has been \$45,075.51.

Mr. SLEMP. What is your next item?

CONSTRUCTION OF FIRE-CONTROL STATIONS AND ACCESSORIES, INSULAR POSSESSIONS.

Col. SHERRILL. We have gotten now to fire control for the insular possessions.

Mr. SLEMP. You are asking \$317,350 under this item for the construction of fire-control stations and accessories, etc., for the insular possessions, and that estimate has been reduced to \$273,350. You ask that the wording of this appropriation be changed by inserting after the words "signal apparatus," the words "subaqueous sounding and flash-ranging apparatus, including their development."

Col. SHERRILL. That was in the agreement between the Chief of Coast Artillery and the Chief of Engineers, in order to take care of the matter that we spoke of yesterday.

Capt. GARLINGTON. It is to take care of it in the insular possessions just as in continental United States.

Col. SHERRILL. They can use the development of the subaqueous and flash-ranging apparatus anywhere, here as in the insular possessions, as under this wording. This would serve to apply it anywhere.

Mr. SLEMP. Will you give us a statement of your balance on hand?

Col. SHERRILL. On December 31 there was an available Treasury balance of \$2,664.76, which will be expended by the end of the fiscal year. That is for the engineering work. Now, I think it would be well to get from the representative of the Chief of Coast Artillery a full statement of the appropriation.

Capt. RUHLEN. The Treasury balance on July 1, 1919, was \$24,449.43; the Treasury balance on March 1, 1920, was zero; the unexpended balance in the hands of the Chief of Ordnance, the Chief of Engineers, and the Chief Signal Officer was \$34,510.53, all of which will have been expended by June 30, 1920.

Mr. SLEMP. In doing what?

Capt. RUHLEN. This appropriation was primarily for the 12-inch long-range batteries in the insular possessions, the installation of which will probably be completed this year.

Mr. SLEMP. This fiscal year?

Capt. RUHLEN. Yes, sir.

Mr. SLEMP. As I understand it, you had on hand as of March 1920, from every available source, for use in the completion of the fire-control projects for the 12-inch long-range batteries in the insular possessions, about \$34,000?

Capt. RUHLEN. Yes, sir.

Mr. SLEMP. And that you expect to use that \$34,000 in the furtherance of that project during this fiscal year?

Capt. RUHLEN. Yes, sir.

Mr. SLEMP. How near completion will they be when that expenditure is made?

Capt. RUHLEN. The engineers will answer the construction question.

Col. SHERRILL. If we are able to use up the \$34,000 balance remaining by the end of the fiscal year, our estimate for the fiscal year 1921 will complete the fire-control installation for the 12-inch batteries.

AHUA POINT BATTERY, HAWAIIAN ISLANDS.

Mr. SLEMP. How much money will you have expended at that time on the fire-control project for the 12-inch long-range battery on Ahua Point, Hawaiian Islands?

Capt. GARLINGTON. The estimated cost of the fire-control project for the 12-inch battery at Ahua Point, based on the detailed estimate of the actual structures to go in, was \$44,600, to which must be added an item of \$20,000 for the Signal Corps material, on which, at the time the estimate was submitted, no work had been done.

Mr. SLEMP. That makes a total of \$64,600?

Capt. GARLINGTON. For that particular project; yes, sir.

Mr. SLEMP. Your estimate is \$74,600, then, for next year?

Capt. RUHLEN. The correct figure is \$64,600.

Mr. SLEMP. That is as of the date of the estimate, or last August?

Capt. GARLINGTON. Yes, sir.

Mr. SLEMP. Have you done any work on this project since then?

Capt. GARLINGTON. No work has been done, but the work has recently been authorized.

Mr. SLEMP. So that, after using the \$34,000 on hand, you estimate that the total cost of the project would be \$64,600?

Col. SHERRILL. You could reduce it to \$30,600.

Mr. SLEMP. Does that take care of the post telephone system?

Col. SHERRILL. No, sir; that is a separate item, amounting to \$10,000.

Mr. BYRNS. Is it the purpose to use the \$34,000 between now and the end of the year?

Col. SHERRILL. We probably will not be able to use all of it.

Mr. SLEMP. This post telephone system is not a fire-control matter, is it?

POST TELEPHONE SYSTEM.

Col. SHERRILL. Yes, sir. At all seacoast defenses the post telephone system is a part of the fire-control system, because all the telephones go through the central switchboard room, and they are always estimated for and constructed by the Engineers.

Mr. SLEMP. Have you a post telephone system?

Col. SHERRILL. The present post telephone system is inadequate for post purposes; the existing 50-drop switchboard being filled, requires

that phones be doubled on one line. It is proposed to install a 100-drop board at a more central location. This involves also the purchase and installation of additional cable. The plans and estimates have been prepared, and this \$10,000 estimate is the result.

Mr. SLEMP. In case of a war emergency you could use the present telephone system there for fire-control purposes, could you not?

Col. SHERRILL. It would be possible; yes, sir.

Mr. SLEMP. It would be more convenient to have a more extended system?

Col. SHERRILL. The garrison has no other means of getting its telephone facilities to such places as the quartermaster's storehouse, to the batteries, and fire-control stations. It is all interlocked together, and under ordinary conditions this would be carried in the regular Construction Division appropriation in the Army bill; but if you did, you would have a division of work there which would be very uneconomical. Consequently, they have always carried it here. This is recommended by the department commander as essential to the efficient operation of the post, and I think it should be authorized. In a war emergency they could undoubtedly function as they are, but if this is not granted they will be handicapped there and will not be given the usual facilities given to such posts.

DETAILS OF ESTIMATE.

The next item is for a protected switchboard room, at Fort Ruger, \$9,000; a protected switchboard room, at Fort Kamehameha, \$1,500; and Signal Corps material, \$11,500, making a total of \$22,000. The total for the Hawaiian Islands is \$96,600. It is proposed to construct a new switchboard room inside of the entrance tunnel to Diamond Head Crater for Fort Ruger. At Fort Kamehameha protection will be secured by removing the switchboard from its present location to a room in Battery Selfridge. One of the most vital points at a defense station is the switchboard room. It is the custom to protect it in a bombproof room, and generally they have a place in the battery for the switchboard room, although in some cases it is necessary to construct a room for that purpose.

Mr. SLEMP. Where have they got it now?

Capt. RUILEN. In a small wooden building.

There are other things besides the telephone wires passing through the fire-control switchboard. There are signal systems and also time interval systems, which must be absolutely controlled by wires.

Mr. SLEMP. Did you ever ask for the bombproofing of that switchboard at Fort Ruger?

Col. SHERRILL. No, sir; that is a new item.

Mr. SLEMP. You have gotten along up to date all right with the present facilities?

Col. SHERRILL. You see, those batteries at Diamond Head Crater are just now being finished. As a matter of fact, we have in the estimate an estimate for converting the old battery into a storage magazine and putting mortars in the new location, so that what they have had has been a temporary expedient.

Mr. SLEMP. Is that in this bill?

Col. SHERRILL. Yes, sir.

PHILIPPINE ISLANDS.

Mr. SLEMP. What have you to say about the Philippine Islands proposition?

Col. SHERRILL. The first item in the Philippine Islands is for fire-control projects for 12-inch battery, Fort Mills, \$25,000; Signal Corps material, \$75,000; a total for the battery of \$100,000. The above project includes the construction of B'-B. C., B'', B''''-B. C., and B'''' stations. Detailed plans and estimates have been prepared, the estimated cost of engineer work being \$24,120, with an additional item of \$2,750 for the installation of Signal Corps material. That is new work for the batteries that have just been completed.

Mr. SLEMP. Give an explanation as to why the Signal Corps material for this one battery runs as high as \$75,000?

Col. SHERRILL. In the first place, it is necessary to run submarine cable from this island all the way across to the entrance to Manila Bay, in order to give proper intersection in the channel, both outside and inside the bay. The purchase of that submarine cable and the laying of it is one of the biggest items of this expense. If that battery were located on the mainland that expense would be very materially reduced.

Mr. EAGAN. Does your estimate show how much that expense is?

Col. SHERRILL. The Signal Corps part of it is \$75,000, whereas our part is only \$25,000, and we put up quite a number of buildings for that. This is quite an unusual expense on account of the large amount of submarine cable. There is where the cost mounts. This battery has two 12-inch guns so it is not simply for one 12-inch gun; it is a 12-inch battery for two guns.

FORTS HUGHES, FRANK, AND MILLS.

Col. SHERRILL. The next is switchboard room, Fort Hughes, \$32,500; switchboard room, Fort Frank, \$11,000; latrine in switchboard room, Fort Mills, \$250; a total of \$43,750.

Mr. SLEMP. Have you switchboard rooms there now?

Col. SHERRILL. No, sir; those are new installations; they are new installations to go with this battery.

Mr. SLEMP. Would they be bombproof?

Col. SHERRILL. Yes; they are bombproof; all of our projects call for that. The next item is plotting room, Battery Morrison, Fort Mills, \$10,000. This item covers the construction of a bombproof plotting room at observing station B'7 (B. C.) garrison. The work is required on account of the remoteness of the existent plotting room from the B. C. station, and the fact that the use of telephones in the existing room is made impossible by the use of an adjacent 25-kilowatt set. The next item is bombproof radio station, Fort Mills, which is to be dropped, the amount being \$45,000. The next is lighting fire-control stations, \$2,000. This is to provide for electric lighting of certain structures pertaining to the fire-control installation which have not yet been so equipped. The next item is storehouse for Signal Corps cable, \$20,000. That is to take care of replacements in that remote place as a war necessity.

Mr. SLEMP. At what remote place?

Col. SHERRILL. I mean in the remote location of these islands.

Mr. SLEMP. You are referring to the Philippine Islands?

Col. SHERRILL. Yes; the entrance to Manila Bay, and it is remote from land and remote from the United States.

Mr. SLEMP. Have you not a Government building there that you can use for this purpose without constructing another one?

Col. SHERRILL. No, sir. By the way, Capt. Garlington and Capt. Ruhlen went over all of these estimates in detail after the Office of the Chief of Artillery and the Office of the Chief of Engineers had gone over them. They went over them in great detail with the idea of dropping out all that could be dropped out, and that was done very recently, so that anything we have included is as a result of combing through these estimates.

Mr. SLEMP. You speak of engineer equipment and engineer material. What is that?

Col. SHERRILL. No; Signal Corps material.

Mr. SLEMP. In the item I have before me it is a storehouse for engineer equipment?

Col. SHERRILL. It should be storehouse for Signal Corps cable, for the purpose of protecting from the weather the cable they have there.

Mr. SLEMP. Have you a large amount of it on hand?

Capt. GARLINGTON. Yes, sir.

Mr. SLEMP. Enough to get along without spending this \$75,000 for the purchase of new cable?

Capt. GARLINGTON. This is cable that has to be installed in the fire-control projects other than the 12-inch battery; it does not take care of that item for the 12-inch battery.

Mr. SLEMP. You would only want your storehouse for the reserve, would you not?

Capt. GARLINGTON. When the material is received it has to be stored for a certain time until it can be put into the installation, and there is always some time lapsing, and there always has been an accumulation ahead of the installation, that accumulation having to be protected until it is put in, and that is the reason for this estimate.

Mr. SLEMP. It does not seem to me that makes a very strong case for a \$20,000 building.

Capt. GARLINGTON. That is just about the case.

Col. SHERRILL. That is about the status of it.

Mr. SLEMP. Is there anything else under this item?

Col. SHERRILL. Not under this item; no.

Mr. SLEMP. What is your next item?

FORTIFICATIONS AND ARMAMENT THEREOF, PANAMA CANAL—MAINTENANCE OF CLEARINGS AND TRAILS.

Col. SHERRILL. The next item relates to the Panama Canal.

Mr. SLEMP. For fortifications and armament thereof for the Panama Canal, to be immediately available, you are asking \$61,000 for maintenance of clearings and trails. Your current appropriation for this purpose is \$30,000. What is the state of your balance?

Col. SHERRILL. There was available on December 31, 1919, \$10,940.13, which it is estimated will be expended by the end of the fiscal

year. The estimate submitted by the authorities of the Panama Canal was for \$61,000. After conferences in the War Department, this estimate has been reduced by \$19,800, leaving a total of \$41,000 that is now requested. That appropriation is expended to take care of the maintenance of clearings and trails on the Panama Canal for defensive purposes and for communicating with outlying detachments outside of the area covered by the roads on the Canal Zone. The item of \$19,800 that we cut out was for certain new trails, one in the vicinity of Cristobal, and one in the vicinity of Balboa, which, while desirable, are not considered absolutely essential.

Mr. BYRNS. You do not propose to open any new trails next year?

Col. SHERRILL. No, sir; this is only for maintenance.

Mr. BYRNS. Does it cost \$41,000 to maintain trails down there?

Col. SHERRILL. There is an item of 74 miles of trails to be cleared at a cost of \$100 per mile. The growth is so luxuriant that it grows high in one season. That is on the Atlantic side, and on the Pacific side there is an item of 98 miles of trail, at \$100 per mile. Then, on the Atlantic side there are 1,400 acres of clearing to be done at \$10 per acre, and on the Pacific side there are 1,000 acres to be cleared.

Mr. SLEMP. Most of this ought to be for the pay of labor?

Col. SHERRILL. Most of it is for services.

Mr. SLEMP. You estimate for equipment and material \$14,175, whereas in 1919 you expended for that purpose \$7,087.68. As a matter of fact, you should not require new equipment for that work.

Col. SHERRILL. I would not like for you to take those figures in that statement as being of very great value, because they are simply an estimate made up in the office. What we hold to is the cost that we know has been required in the past to do certain work—that is, there is a certain unit cost for clearing trails and a certain unit cost for clearing land. You will notice in our estimates that we have classed as essential \$30,000, and as desirable, but not absolutely essential, \$11,200.

Mr. SLEMP. Now, some of the trails that you are proposing to keep clear next year are the same trails that you got an appropriation for the purpose of keeping clear this year.

Col. SHERRILL. That is for maintenance.

Mr. SLEMP. Last year you stated that it would cost \$50 per mile for the maintenance of trails; and now, this year, you submit an estimate of \$100 per mile.

Col. SHERRILL. That is simply the difference in the cost of labor. The cost of labor on the Canal Zone has practically doubled—not in the last year, but in the last two or three years. Within the last two or three years the cost of labor has practically doubled, and it has increased very materially even recently. Recently the Jamaican employees were out on a strike demanding higher wages than heretofore. As I say, we have investigated this, and we agree that we can allow a still further cut of \$11,200. That would make a total of \$30,000.

Mr. SLEMP. You will require \$30,000?

Col. SHERRILL. Yes, sir; we think that would be adequate.

Mr. BYRNS. Are any of those trails outside of the Canal Zone?

Col. SHERRILL. Yes, sir; some of those trails go out quite a distance from the canal areas, where we take the troops out for maneuvers.

Gen. MARSHALL. Under the Isthmian Canal Commission.

Mr. SLEMP. And you represent that commission here in presentin this?

Gen. MARSHALL. Yes.

Mr. SLEMP. Based upon written reports sent to your office?

Gen. MARSHALL. Yes; I present it from those reports. I digest the reports and present it to you as best I can.

Mr. SLEMP. With reference to the ordnance facilities at Fort Randolph, is this an entirely new construction item of \$35,000?

Gen. MARSHALL. Yes, sir; that is a new building.

Mr. SLEMP. Have you any ordnance shop buildings there now?

Gen. MARSHALL. I can not answer the question positively, but apparently there is no ordnance repair shop there.

Mr. SLEMP. Where are those repairs being made?

Gen. MARSHALL. I can not answer that. They have a frame store house which is used as an artillery, engineer, and ordnance office.

Col. SHERRILL. I am familiar with the Panama Canal and they have none there, but they have one for the ordnance themselves at Corozal, but not for the artillery.

Mr. SLEMP. At what point have you been making your ordnance repairs?

Col. SHERRILL. That I could not say.

Mr. SLEMP. Gen. Marshall, will you put a statement about that in the record?

Gen. MARSHALL. Yes.

FORT RANDOLPH, CANAL ZONE—MACHINE SHOP, ORDNANCE STOREROOM, AND ARTILLERY ENGINEERS' ELECTRICAL SHOP.

The building proposed herewith will provide adequate and approved facilities for the ordnance machine shop, ordnance storeroom, Artillery engineers electrical shop, office, and storeroom. Constructed of reinforced concrete and located directly in the rear of a parapet, this building will be protected from the major part of a hostile fire and will provide such protection for the machinery as to continue it in working order during even intense and continued bombardments. It must be remembered that the proper functioning of the ordnance machine shop is absolutely essential to the maintenance of the armament of the fort in time of hostilities that any damage or destruction to it will result in silencing the batteries of the fort much sooner than could be done by hostile fire alone. This building is extremely necessary and should be by all means authorized at once.

The equipment of the present ordnance repair shop at this post consists of only one lathe and one drill, this being all the available floor space will permit. The total armament which must be kept in repair at this fort consists of two 14-inch guns, eight 12-inch mortars, four 6-inch guns, six 4.7-inch guns, and two 3-inch guns, together with an assortment of machine guns, caliber guns, range finders, depression finders, etc. In addition the major repair items from Fort Sherman will be done at this shop, Fort Sherman having equipment for doing only the smaller items of repair. The lack of machinery at the fort necessitates the sending of all but the most minor repairs to the shops at Cristobal on the Atlantic side of the canal. The poor condition of the roads from the fort to Colon makes shipment by water necessary, thus causing long delays and great expense.

In the near future there will be extensive modifications made to the 14-inch guns. It is earnestly desired that an ordnance machine shop may be constructed immediately so that this work can be done in that shop, as to do so will result in a very considerable saving of money to the Government. The same modification is at present being made on the Pacific side of the canal in the ordnance machine shop at Fort Grant. The cost of this work at Fort Grant shows a saving of from 70 to 80 per cent on some items, as compared

with quotations for the same work from the Panama Canal shops. The reason for the large saving is the tremendous overhead expenses at the Panama Canal shops. An estimate of the cost of the work which it is desired to do at Fort Randolph on this one item of modification of the 14-inch guns received from the Panama Canal shops is \$2,000 per gun. The armament foreman at the ordnance repair shops estimates that he could do the same work if machinery were available for \$1,200, showing a saving of \$800, or 40 per cent, per gun to the Government on this one item.

Recently a large part of the trained personnel of the Coast Artillery Corps has been taken away from the canal, leaving vacancies which must be filled by recruits. During the period before these recruits become thoroughly familiar with the armament there will be many more repairs than ordinarily. This renders the need for an ordnance machine shop at the Atlantic side of the canal more acute than ever. It must be kept in mind that as a measure of defense it is almost as important that a fully equipped repair shop be available in the immediate vicinity of the guns themselves as it is that the guns be there.

BARRACKS AND QUARTERS, FORT SHERMAN.

Mr. SLEMP. General, in the bill of last year you had an item of \$140,000 for the construction of barracks, quarters, and other necessary buildings for Coast Artillery troops at Fort Sherman, including water and sewer systems, roads, walks, etc. How are you getting along with that construction?

Gen. MARSHALL. We have no report on that at all.

Mr. SLEMP. You are not asking for any money for that purpose this year, and I suppose they have enough money on hand.

Gen. MARSHALL. Yes, sir.

Col. CORBIN. Gen. Kennedy, when he was here before the sundry civil committee, made the statement that the construction there would be approximately completed on June 30, using up the entire amount appropriated last year.

Mr. SLEMP. And making the construction within the appropriation?

Col. CORBIN. Approximately so.

Mr. BRYNS. I believe he made the same statement with reference to the wharf at Fort Sherman.

WEDNESDAY, MARCH 24, 1920.

INSTALLATION AND REPLACEMENT OF ELECTRIC LIGHT AND POWER PLANTS IN UNITED STATES.

Col. SHERRILL. Mr. Chairman, referring to the item on page 34 for the installation and replacement of electric light and power plants at seacoast fortifications of the United States, I would like to submit the following communication from the Chief of Engineers to the chairman of this committee:

TECHNICAL EMPLOYEES.

MARCH 24, 1920.

CHAIRMAN APPROPRIATIONS COMMITTEE,

House of Representatives, Washington, D. C.

SIR: 1. The Army appropriation act approved July 11, 1919, contains the following proviso:

"Provided, That the services of skilled draftsmen, civil engineers, and such other services as the Secretary of War may deem necessary, may be employed

Mr. BYRNS. Do you keep a large amount of reserve there? I notice that in 1916 and 1917 you had appropriations of \$7,500.

Col. SHERRILL. The reason for that increase is that we have been completing the searchlight installation down there rapidly during the past few years. When I was there in 1917 we had, I think, 10 on the Atlantic side and 7 on the Pacific side. Since then we have added materially to the number of them. Of course, since we turned over the searchlight plant for operation, it has to be maintained, and that makes a little greater burden on the operating funds.

Mr. SLEMP. I wish you would clear up that war reserve matter by preparing a statement showing the amount invested in the war reserve fund during this fiscal year, and the amount you intend to invest in the war reserve fund out of this appropriation.

Col. SHERRILL. I will do so.

(The statement referred to follows:)

The accumulation of the war-reserve stock at the defenses of the Panama Canal is ordinarily accomplished under the specific appropriation for "Reserve equipment, Canal Zone, Panama Canal." During the war, on account of the necessity of continuous operation of searchlights and other electrical equipment, it became necessary to withdraw equipment from the war reserve and put it to actual use, the intention being to eventually replenish the stock to the extent to which withdrawals had been made, charging the cost of such replenishment to the appropriation for "Maintenance of searchlights, electric light and power equipment, Panama Canal."

The replenishment of the war-reserve stock has not yet actually been accomplished, although this office now has under consideration a requisition for parts necessary to complete the war-reserve stock, involving an expenditure of approximately \$16,000. The cost of completing this requisition will be charged against the appropriations for reserve equipment and for maintaining searchlight and electrical installations at the canal in the proper proportion. On account of the increased demands against the appropriation for the maintenance of searchlights and electrical equipment, due to the installation of new items of searchlight and generating equipment during the past fiscal year, it is not certain that it will be possible to provide from this appropriation the amount originally estimated. It is, however, expected that available funds will be sufficient to cover all expenditures involved during the current fiscal year.

The estimate submitted for next fiscal year is not in excess of what it is believed will be required for the actual maintenance and upkeep of the searchlights and electrical equipment during the year, irrespective of any accumulation of war reserve, and, therefore, it is strongly urged that the amount asked for be appropriated.

Mr. SLEMP. The total amount in the war-reserve fund was \$50,000?

Col. SHERRILL. Yes, sir; that amount was originally secured.

Mr. SLEMP. What is the next item?

CONSTRUCTION OF SEACOAST BATTERIES, PANAMA CANAL.

Col. SHERRILL. The next item is for battery construction, Panama Canal. The balance on December 31, 1919, was \$8,873.12, which will be expended by the end of the fiscal year. This estimate is submitted to cover the cost of completing two 12-inch long-range batteries at the mouth of the Chagres River during the fiscal year 1921. Work on these batteries is now nearing completion, but it is estimated that certain minor items will remain uncompleted at the end of the current fiscal year.

Mr. SLEMP. What do you mean by "minor items"?

Col. SHERRILL. That would probably be minor items of wiring in connection with the power plant and communication system, and possibly the dressing up of slopes and cleaning the plant and getting it in condition to turn it over for operation. Then, there is a small item of concrete work to be done and little adjustments to be made in various parts of the system, such as the range-indicator systems, etc.

Mr. SLEMP. Is this \$20,000 in excess of the original estimate for the completion of the batteries?

Col. SHERRILL. Yes, sir; caused by an increase in the cost of material and labor in that period of time.

Mr. BYRNS. You say that the work is practically completed?

Col. SHERRILL. I recall in a general way that the reports from Panama indicate that the work is practically completed. In our monthly work report we have statements which show the status of the work up to the end of the month, and in cases where you want the detailed information, we can give you the absolute condition. We have a complete statement of it up to certain dates, and we can show the work added during the month, and we can give you just what you call for.

STATEMENT IN CONNECTION WITH ESTIMATE FOR COMPLETING 12-INCH LONG-RANGE BATTERIES, PANAMA CANAL.

The heavy concrete work was all completed March 1, 1919, but subsequent to that date there remained the work of finishing the exposed concrete surfaces and a good deal of miscellaneous concrete work, such as conduits, drains, stairways, B. C. stations, walks, power-room radiator flues, etc. The principal items of work that had been going on during the past calendar year since that date, in addition to the foregoing, are waterproofing outside concrete surfaces, parapet and overhead fill, grading of sand and planting grass on slopes, installation of electric lights and wiring power plants, speaking tubes, plumbing, cable conduit systems, and dismantling concrete plant and mounting of guns.

While it is true that the above work has very nearly completed the battery, the fact remains that after June 30, there will still remain an amount of work to be done involving an expenditure of approximately \$20,000. The principal items that will remain to be done after that date are:

(a) The completing of the electric lighting and power system which can not be completed prior to that date because of the fact that the material can not all be delivered on the Isthmus in time. Estimated cost, \$1,500.

(b) Purchase and installation of mechanical range indicators. Can not be accomplished this fiscal year because designs originally prepared have to be modified due to recent developments in system desired by Artillery. Estimated cost, \$12,000.

(c) Installation of ceiling trolley conveyor system for handling projectiles and powder. Delayed due to change in method of packing powder and uncertainty as to final scheme to be adopted. Estimated cost, \$1,000.

(d) Preparation of record drawings and plans of battery and accessories. \$500.

(e) Painting of concrete. Concrete surfaces at all batteries are painted a dark color not only to reduce visibility but to prevent glare which is sufficiently severe even in the United States to make this necessary. In the Tropics this glare is, of course, much worse than in the United States. This work can not be done until after all other work at the battery has been completed and therefore can not be done this fiscal year for that reason, and also on account of the fact that the rains set in beginning in May and this painting should be postponed until the following dry season, anyhow. Estimated cost, \$5,000.

Mr. SLEMP. Take the next item.

PURCHASE AND INSTALLATION OF ELECTRIC LIGHT AND POWER PLANTS,
SEACOAST FORTIFICATIONS, PANAMA CANAL.

Col. SHERRILL. The next item is searchlights for seacoast defenses, Panama Canal.

Capt. GARLINGTON. The next is for electric installation, Panama Canal.

Mr. SLEMP. For the purchase and installation of electric light and power plants for the seacoast fortifications on the Canal Zone and for land defenses. Those two items are out?

Col. SHERRILL. They are out.

Mr. SLEMP. Have you all the kilowatt sets you need down there for those fortifications?

Col. SHERRILL. So far as we know we are complete as to those for the existing armament and we are not asking for any new battery construction down there this year.

RESERVE ENGINEER EQUIPMENT FOR FORTIFICATIONS OF THE PANAMA
CANAL.

Mr. SLEMP. You had \$7,500 last year and this year you ask for \$16,000 for reserve engineer equipment for fortifications of the Panama Canal; what is your balance?

Col. SHERRILL. There was on hand December 31, 1919, \$7,739.61, which will be expended during the year.

Mr. SLEMP. That is entirely a war reserve fund?

Col. SHERRILL. Yes; that is the original \$50,000 reserve fund.

Mr. SLEMP. How much is in that fund now; do you know?

Col. SHERRILL. This reserve equipment is a little different from that other appropriation for maintenance, upkeep of searchlights, and so on, in that this provides for the spare parts of all kinds. For instance, if you have a searchlight mirror broken—which I have known to occur down there—it is just to replace that, and any of that war reserve used during the war. This \$16,000 estimate is to bring that up to the standard condition.

Mr. SLEMP. Is it necessary to expend all that money this coming year?

Col. SHERRILL. Not absolutely essential; no. It is something we could spread over two or three years if necessary. It is just against a war emergency.

PURCHASE AND INSTALLATION OF SEARCHLIGHTS, SEACOAST FORTIFICA-
TIONS, CANAL ZONE.

The next item is for searchlights, \$6,000. This item is for converting certain wooden operating platforms into concrete platforms. On account of the rapidity with which timber deteriorates down there, all of those platforms originally put in with the searchlights will shortly be rotted away, and it is necessary to replace those, and it is the intention to replace them with concrete.

Mr. SLEMP. Have you any money on hand in this appropriation?

Col. SHERRILL. Yes; there was a total available of \$120,044.41, which will be expended during the year. That is for the completion

of the new construction work at the Atlantic entrance of the Panama Canal.

Mr. SLEMP. How many searchlights do you propose to install, or do you propose to purchase any?

Col. SHERRILL. That is purely installation.

Mr. SLEMP. How many are you proposing to purchase?

Col. SHERRILL. Next year, none; this completes it.

Mr. SLEMP. Does this complete the entire searchlight program for Panama?

Col. SHERRILL. For the existing armament for the canal; yes.

Mr. SLEMP. How many concrete platforms do you expect to make?

Col. SHERRILL. There are three of those searchlight operating stations we are going to replace.

Mr. SLEMP. What would you do about the remaining platforms?

Col. SHERRILL. Those have already been taken care of. The particular ones mentioned here are the first ones we built down there near Chagres, over at Tortuguilla Point, Naranjitos Point, and Toro Point.

Mr. SLEMP. Did you install any of those disappearing tower searchlights?

Col. SHERRILL. Yes, sir.

Mr. SLEMP. How many of those?

Col. SHERRILL. One of those is installed at Fort Randolph. We have, however, two or three searchlights on box cars with an elevating device, but this one I speak of is the bascule type, elevating, and it is used on a very low spot where it is impossible to get it protected in any other way except to place an embankment of sand in front of it and elevate it when in use.

Mr. SLEMP. Have you a good reserve of searchlights?

Col. SHERRILL. We have a reserve of searchlight parts, but no reserve searchlights in Panama.

Mr. SLEMP. I understand your project is complete so far as searchlights are concerned. That means you ask for no more money down there for that purpose?

Col. SHERRILL. No; not for installing new searchlights.

Mr. SLEMP. How long have these wooden platforms been there that you wish to replace?

Col. SHERRILL. Those were put in when the fortifications were first built, about 1914, I think, or 1913, when the Panama Canal first undertook the building of those fortifications.

Mr. SLEMP. Are they entirely of wood, or just the tops?

Col. SHERRILL. The operating platform; that is the platform on which they are brought out. They are brought out on a track and this operating platform is placed all around them for the men to get on and operate the lights. Those are the things we are replacing in order to make them more permanent.

PURCHASE OR RECLAMATION OF LAND FOR DEFENSE OF PANAMA CANAL.

The next item is for sites. Panama Canal, \$6,250. There is no available balance on hand and no expenditures are expected. This is a small item to take care of a site that is required for fire-control purposes outside of the canal. Most of the fortifications on the canal required no expenditures of funds out of our appropriation, be-

cause they were paid for from the lump sum we used to pay for the canal. But when we go outside of the canal area, as in this case——

Mr. SLEMP. To which battery do you refer?

Col. SHERRILL. This is to buy the site for the station for the batteries at Tidball and Zalinski, Fort Randolph—there are two 12-inch batteries—and also to provide room for a bunk house and auxiliaries.

Mr. SLEMP. Is most of the money to be used for the house or the land?

Col. SHERRILL. This is solely for the land. The house and all the facilities have been provided for, but under the law the governor of the canal is authorized to take such land as is necessary for defense purposes and then to pay for it, according to the decision given by the Court of Claims.

Mr. SLEMP. Have we already taken over that land?

Col. SHERRILL. Yes, sir; under the governor's authority to build the canal some years ago.

Mr. SLEMP. How much land did we get?

Col. SHERRILL. It is 375 acres, approximately. It is 125 hectares, and a hectare is about 2.4 acres.

Mr. BYRNS. Do I understand this land has already been taken over?

Col. SHERRILL. Yes.

Mr. SLEMP. And this is an obligation of the Government?

Col. SHERRILL. It is an obligation of the Government, and under the procedure on the canal they probably found they did not have enough money to pay for it after they had gotten it. We have done that before, and you have appropriated money for those sites afterwards.

Mr. SLEMP. The next item?

CONSTRUCTION OF SEA WALL AND EMBANKMENTS, PANAMA CANAL.

Col. SHERRILL. The next item is "Sea walls and embankments, Panama Canal, \$500,000." This is an item that has been under consideration for quite a number of years to add an extension to the breakwater in Colon Harbor for the purpose of closing a gap which would allow hostile craft to come into the harbor and do damage.

Mr. SLEMP. That has been under consideration, Colonel, for a good many years, but this is the first time you have ever submitted an estimate for it, is it not?

Col. SHERRILL. Yes. The reason for that is that we have never—this breakwater was under consideration both by the Army and the Navy, and the Navy needs it as a protection against storms for their hydroplane station at Fort Randolph, and the Army needs it to avoid having to maintain an expensive mining company at Fort Randolph, which would cost many thousands of dollars a year. We have an item of——

Mr. SLEMP (interposing). Is the real purpose of this to get an inclosed sea?

Col. SHERRILL. That is what it is. The breakwater is now detached; it is detached from the shore by a considerable gap of 4,000 feet, and the idea of that is to bring it to the shore and make a closed sea for two reasons: In the first place, to prevent having to mine, in

the event of a war, as we did in the late war; and the next thing is to give quiet water for Fort Randolph and the naval hydroplane station. As I say, this item has been given a great deal of careful thought both by the Army and the Navy, and therefore it is not something that has been jumped at as a new proposition. It has been thoroughly considered and agreed to as essential. The total estimated cost of the project will be \$1,500,000, of which \$500,000 is asked now to start construction.

Mr. SLEMP. Give us an engineering description of the character of this wall, the width of base, the height, the length, etc.

Col. SHERRILL. This wall is to have an earth-core fill. In the first place, they will build a trestle out from the shore, and on that trestle they will run out railroad cars and dump down an earth fill which will rest on the bottom at various depths from 2 feet to 40 feet deep. After this earth core has been placed they will then take armor rock from Sosa Hill—that is over on the Pacific coast—and put it in. There are estimated to be 262,000 cubic yards of that at \$1.90 per yard. Then they will cap it off with 1,250 concrete cubes 6 by 6 by 6 feet, at \$150 per cube. That is the same kind of cube they have used on the Panama Canal breakwater that is now there.

Mr. SLEMP. Is there a good bottom to that bay?

Col. SHERRILL. Yes; it has a good bottom. The method they are following is the one they have used heretofore in the detached breakwater. We want to make that a closed basin. The naval hydroplane station, with all this rough water pouring in there, can not operate the hydroplanes at all, nor can they operate small craft.

Mr. SLEMP. This is on the Atlantic side?

Col. SHERRILL. Yes; this is at Fort Randolph. There is a branch of this railroad that comes out there, and we propose to dump this earth core and rock in there and then to cap that off with concrete cubes.

Mr. SLEMP. What is the length?

Col. SHERRILL. It is 4,200 feet, and it will make the top of that breakwater approximately 20 feet wide slightly above mean sea level, and giving an average width of base of about 150 feet.

Mr. SLEMP. How long will it take to do that work?

Col. SHERRILL. We expect to do this in three annual appropriations of \$500,000 each. The Navy Department, as well as the War Department, have strongly urged this as an emergency matter.

Mr. SLEMP. Upon whom did they urge that?

Col. SHERRILL. They urged it to the joint board of the Army and Navy, which, in turn, put it up to the War Department to submit the estimate. So that this is the joint action of the Army and the Navy that is proposed here.

Mr. SLEMP. Does not the Navy like rough water?

Col. SHERRILL. Not for their naval submarine and hydroplane base. I have a little item here in reference to that: This breakwater is required to close the gap now existing between the east breakwater and the shore. It will, when completed, prevent the entrance of enemy light-draft vessels and submarines, and, in addition, will serve as a protection to the naval submarine base and hydroplane station at Coco Solo Point. The main idea is to get the thing closed,

and it will save a very large maintenance cost. They proposed formerly to have a mine company there of 100 men, at a very large expense, to say nothing of the structures that would be necessary for mining casemates, and so on. In fact, they had \$40,000 two or three years ago for that purpose.

Mr. SLEMP. You would have to have mines outside of the breakwater, would you not?

Col. SHERRILL. No, sir; because there would be left only one channel, namely, the main entrance between the two breakwaters, and that would be stopped by booms and nets and the Navy might throw mines around that central entrance; but the gap in question would be absolutely protected. And that open place gave both the Army and the Navy down there a great deal of concern during the war.

Mr. SLEMP. There is no civil necessity for it, is there?

Col. SHERRILL. Yes, sir; it is desirable from a civil point of view, but not absolutely essential. They could get along without it, but it would very much improve the anchorage in there, inside the breakwater, and would make the water considerably smoother. But that is not the reason; the main reason is military, pure and simple.

Mr. SLEMP. You have a breakwater on the west side, have you not?

Col. SHERRILL. Yes. That breakwater on the west side joins the shore at Toro Point at Fort Sherman.

Mr. SLEMP. The channel is in between the east and west breakwaters?

Col. SHERRILL. Yes. It is right straight through.

Mr. SLEMP. Just one thing more on this other item: Are these other breakwaters that you already have there constructed in the same way you desire to construct this one?

Col. SHERRILL. Yes, sir; of the same general type.

Mr. SLEMP. How long have they been constructed?

Col. SHERRILL. They have been constructed there since the beginning, at the time the canal began. They were finished, I think, in 1914.

Mr. SLEMP. How do they endure the wear and tear of the waves there?

Col. SHERRILL. They stand it very well, but from time to time the canal authorities have added a small amount of concrete block to the top. But they are in very much deeper water than this will be, and, consequently, the wear and tear and subsiding will be greater than in this.

Mr. SLEMP. Do they find that those breakwaters gradually sink?

Col. SHERRILL. No; nothing except what the storms do to the top of it.

Mr. SLEMP. The next item is—

PREPARATION OF PLANS FOR FORTIFICATIONS AND OTHER WORKS OF DEFENSE, PANAMA CANAL.

Col. SHERRILL. For the preparation of plans for fortifications and other works of defense, including survey for roads, Panama Canal.

Mr. SLEMP. You have reduced the estimate from \$250,000 to \$50,000?

Col. SHERRILL. To \$50,000, but the authorities on the canal ask for \$250,000. This is to make a complete study of the system of land defenses on the canal. The present condition of the seacoast defenses, from the point of view of naval attack, is very much better than are the defenses against a force landing and coming in behind the fortifications.

Mr. SLEMP. You mean landing somewhere else other than on the canal?

Col. SHERRILL. Yes; out some 30 or 40 miles and coming in from the land and attacking the fortifications from the reverse side. From time to time, the local authorities on the canal have submitted estimates for roads and storage facilities for food supplies and gasoline, and those have been returned to them with directions to draw up a complete plan of defense, showing how the roads and the storage and the troops that are assigned will fit into that plan. Then we can go to Congress and tell what the necessities are. The Chief of Engineers decided that the \$50,000 would be a sufficient amount to get the type of plans that are necessary and the reason for that is this, that the canal authorities wanted to make the most detailed investigation of the roads, with borings and detailed plans for bridges and so on, and our attitude was that until Congress had authorized this, on the basis of a general location, showing where the roads were to go and what they were to be used for, it would not be necessary to go into that detail.

Mr. SLEMP. I suppose the Republic of Panama has no topographic survey?

Col. SHERRILL. No, sir. We are making one ourselves with the troops down there, and for this investigation they will take those troops and make the surveys and lay out those general roads. And this is to be a complete, comprehensive plan of defense and detailed plans of all storage facilities required.

Mr. SLEMP. Do the engineers make that topographic survey?

Col. SHERRILL. Yes, sir; it is the Engineer troops in the Canal. There is a small appropriation carried in the Army bill for making that.

Mr. SLEMP. I suppose they make notes of bridges, rivers, and streams and forests?

Col. SHERRILL. Oh, yes. They make the topographic survey, but it does not involve a great deal of mapping out the lines to tell just about where these roads go through. In other words, they simply get the general topography. We want to go in there and to go into more detail, to tell in a fairly close way what roads we want, and also to tell how much it is going to cost. And that, I think, has been the policy of Congress, to encourage the preparation of plans, so that you would know what you were going to do when you embarked in any big project of that kind.

CONSTRUCTION OF FIRE-CONTROL STATIONS AND PURCHASE AND INSTALLATION OF ACCESSORIES THEREFOR, PANAMA CANAL.

The next item is fire-control stations at fortifications, Panama Canal, \$474,001, estimate. On December 31, 1919, there was available a balance of \$66,836.38 in the hands of the district engineer, all of

which will be expended during this present fiscal year. This item of the estimate is divided up according to a detailed list we have here. Radio station, Cristobal, \$12,000; radio equipment for two stations, \$18,356. That is to take care of equipment for stations now in existence at the Balboa end of the canal, by which they will keep in touch with the vessels coming in, and similar equipment at the station on the Atlantic side. Then there is the coincidence range finder station for six 6-inch batteries, at \$2,400 each, \$14,400.

That is essential for the fire control of these small caliber batteries for which they use these range-finder instruments, some 9 or 15-feet long, as a base line, instead of having a widely extended land base. Then there is an item for sundry features connected with the fire control. The total of those items is \$14,095, made up as follows: Installation of cable to connect plotting rooms at Fort Grant, mortar batteries, with power room, \$1,089; reserve communication cable in elevator shaft at Flamenco Island, \$2,662. That is a shaft some 300 feet high. A tunnel goes into the base of that cliff and then goes up 300 feet to the batteries on top, and this is to give a reserve cable in case of any breakdown of the present system, because everything depends for the operation of that battery on this cable. Then additional cable for reserve between switchboard rooms, Naos and Flamenco, for the same reason, \$9,378. Additional cable between subhuts at Perico, \$448. Lighting instruments at seven outlying stations, \$518. That is the placing of a storage battery with the small lighting systems in order to light the instruments so that they can be used at night. The next separate item is 10 datum points, \$3,000. Those datum points are structures used for aiming and orienting the instruments and they are placed out a considerable distance from the fortifications, usually along the edge or out in the sea. Those are essential for the proper handling of the instruments.

Then new fire control for the Chagres 12-inch batteries, \$166,050. Signal Corps equipment, cable and installations, \$225,400. Sites \$7,200. The total of those items for the 12-inch batteries is \$398,650. That is for the batteries that have just now been completed, and this is based on the detailed plan submitted which has the approval of the Chief of Coast Artillery and the Chief of Engineers of the War Department.

Basis of estimate.

Radio station, Cristobal-----	\$12, 000
Radio equipment for two stations-----	18, 356
	<hr/>
Total -----	\$30, 356

This item covers the construction of a radio and signal station, with balanced masts, dormitory, etc., at Fort Sherman, together with two sets of equipment—one for the Fort Sherman station and one for a similar station now under construction at Fort Grant. Detailed plans and estimates have been prepared. The latest estimate indicates that construction will cost \$16,361 (665.4—Crist—F7).

C. R. F. stations for six 6-inch batteries, at \$2,400 each-----	14, 400
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This construction is necessary to accommodate C. R. F. instruments available for installation.

Sundry items-----	14, 000
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This estimate is to provide for the accomplishment of the following items: Installing cable to connect plotting rooms at Fort Grant, mortar batteries, with power room, \$1,089.

Reserve communication cable in elevator shaft, Flamenco Island.....	\$2, 662
Additional cable for reserve between switchboard rooms, Naos and Flamenco.....	9, 378
Additional cable between sub huts at Perico.....	448
Lighting instruments at seven outlying stations.....	518
Total.....	\$14, 095
10 datum points.....	3, 000

This item covers construction of new datum points which are essential for existing fire-control installation.

Fire control, Chargres 12-inch batteries.....	166, 050
Signal Corps equipment, cable and installations.....	225, 400
Sites.....	7, 200
Total.....	398, 650

Detailed plans and estimate have been prepared for this work (665-Crist-F9).

Total for fire control, Panama Canal..... 474, 001

Those batteries are arranged to fire at 27,500 yards, and on account of that long range it has been necessary to go out a considerable distance on each side of the batteries themselves and locate these stations on high hills, from which they can get the necessary intersection of the enemy's vessel.

Mr. SLEMP. Is not this the most expensive proposition you have ever known about in the way of fire-control installation?

Col. SHERRILL. I think it is.

Mr. SLEMP. It is about twice as much as any other——

Col. SHERRILL. No; because this is for four batteries and, not only that, but it is for four batteries designed for firing about twice or three times, at least twice, as far as our other batteries put down there several years ago. For instance, the old 14-inch batteries put down there in 1911 will only fire about 18,000 yards, and these fire 27,500 yards and, consequently, we have to cover a much more extensive area with the base line than we had for those.

Mr. SLEMP. But you would not have a very much different base line for four batteries than for two batteries, would you?

Col. SHERRILL. Oh, yes, indeed.

Mr. SLEMP. How much?

Col. SHERRILL. Each one has to have its own stations and own connections and they have to have additional and much more expensive cable, more pairs of conductors to go into that cable.

Mr. SLEMP. The same stations, but with different cables emanating from those stations?

Col. SHERRILL. No. With the system they follow, this is to have stations for each battery that is operating; otherwise, you see, you do not get the definite information. They can not use the same personnel to give information to all these batteries. And not only that, but in this fire-control system, they have an auxiliary battery commander's station off several miles from the battery.

Mr. SLEMP. Of what are those stations built?

Col. SHERRILL. Those stations are wooden, slightly fireproofed, construction; built on high towers at very remote places and with great difficulties of transportation.

Mr. SLEMP. What is the length of your base line.

Col. SHERRILL. They have in that particular system what we call a broken base line. For instance, here are the batteries [illustrating] and here is a 200-foot hill over across the canal toward Fort Randolph. The batteries are at Chagres. That is probably, I should say, about 12,000 yards. This broken base line that goes down to the Chagres River is 9,000 or 10,000 yards.

Our total base line is in the neighborhood of 20,000 yards. For a certain area on this side [indicating] we use this portion of the base [indicating], and for the area over toward the right of the canal we use this base [indicating]. We can also use the entire base for vessels in front of the fortification here [indicating]. We admit that that is very expensive, but we have not found anything yet that will enable us to get away from it.

Mr. SLEMP. Does this complete the fire-control stations entirely, for all of the batteries?

Col. SHERRILL. Yes, sir; this is estimated to complete all new construction of fire-control systems in the Panama Canal.

Mr. SLEMP. What is the total amount you have expended for the installation of fire-control stations and accessories here?

Col. SHERRILL. We will have to insert that in the record, because most of that, or a large part of it, was expended by the Panama Canal before it came under the control of the Chief of Engineers.

Mr. SLEMP. Is this the first estimate made by the engineers?

Col. SHERRILL. No, sir; the Chief of Engineers has had it in his hands for about four years. We will give you a complete statement covering the fire-control expenditures.

Statement of fire-control expenditures, Panama Canal.

Appropriations:

1913 -----	\$200,000. 00
1914 -----	50,000. 00
1915 -----	383,301. 30
1918 -----	342,888. 85
Total appropriated -----	976,190. 15
Balance Jan. 31, 1920 -----	55,038. 02
Expenditures -----	921,152. 13

Mr. SLEMP. These radio signal stations are experimental?

Col. SHERRILL. No, sir; they are for communicating with vessels coming into the canal and with patrol boats and tugs towing targets. They are combined signal and radio stations.

Gen. COE. The fire-control problem out there is a difficult one on account of the tropical jungle. The whole territory is covered by trees running up to 150 feet high, and, in order to get to any place from which you can see out to the ocean, although you may be on the side of a hill, it is necessary to construct a tower from 100 to 150 feet high. I went over this whole project on the ground last spring a year ago. The officers climbed trees out there to see if they could get in behind where they could put in stations to control the fire. It was the expectation to utilize those stations, once they are installed, not only for fire control for the 12-inch long-range batteries which are now furnished, but to utilize them also in the event of the construction of any other batteries that may go in there.

It is thought that any future armament installed can be controlled effectively from those stations with the base lines as we have laid them out. The most important single item of cost is \$166,050 for cable. That includes over 30,000 yards of cable. We can not at the present time use successfully the radio telephone. As I told you yesterday we have had some success with the experiment, but if we relied upon it we would feel that we would be badly off on account of the interference by hostile naval forces and atmospheric difficulties, and that it might be put out of commission at a time when it was extremely important for us to be able to communicate with the base stations. Therefore, we have submitted this estimate. It is, of course, within the range of possibility that before it is installed the radio telephone may be developed to such a point that it would be satisfactory for that purpose, but I do not think it is likely now or even in the next few years. Therefore, as these two batteries protect a most vital element in the canal, we thought there was nothing else to do in order to enable them to be used except to submit this proposition. It is, as Col. Sherrill says, the most extensive fire-control proposition ever submitted, and it is also the most difficult fire-control problem that we have ever had to meet.

MR. BYRNS. As I understand it, unless this expenditure is made, the batteries will be helpless?

GEN. COE. They would be as helpless as though they were in this room. They are in the midst of a tropical jungle. We had to go there in order to bring the fire to bear on the necessary water areas. Of course, a small portion of the forest could be cut down, and, in fact, one of the batteries has a small arc of fire which can be seen from the battery itself. In order to broaden that arc of fire it would be necessary to destroy hundreds of acres of jungle, which is out of the question. They are tremendous trees, four or five feet in diameter, and 100 feet or more in height.

MR. BYRNS. Is it expected to expend all of this money and to complete the work during the next fiscal year?

COL. SHERRILL. Yes, sir.

MR. BYRNS. You need all of it?

COL. SHERRILL. Yes, sir.

GEN. COE. The items for reserve cable, which Col. Sherrill has referred to, and which are small items, are between vital points in the line of communication. They are short reserve lines, one being between two switchboard rooms, and the other in an elevator shaft connecting the battery with the switchboard rooms. This is the most difficult fire-control proposition we have ever had. That jungle down there is hard to handle. You have to go to a point where you can build a tower 150 feet high. Of course the engineer expense is in the tower construction mainly, although a large part of the engineer expense is in the purchase of the cables.

COL. SHERRILL. That is one of the Signal Corps expenses, because they get the material and we install it. Of course it costs a good deal of money to install it.

MR. SLEMP. What are these towers made of?

COL. SHERRILL. Such towers as have been constructed have been of redwood, because that is the only wood that will withstand the tropical ants; it is now proposed to build reinforced concrete towers.

MR. SLEMP. How much would one cost?

Col. SHERRILL. I would have to give that from recollection. My recollection is that one of those stations costs about \$12,000. That is on account of the great difficulty in taking by hand every piece of this timber around the coast line, and then taking it through the jungle practically on the backs of men. In some of the construction work out there near the Chagres River we had Jamaicans carrying gravel on their backs in little bags weighing about 90 pounds. The cement was carried the same way. It is a very expensive proposition. The timber was carried in the same way. It must be gotten out at a great distance in a difficult country and carried practically by man power.

Mr. SLEMP. You wish the words "subaqueous, sound and flash ranging apparatus" included?

Col. SHERRILL. Yes, sir.

WEDNESDAY, MARCH 24, 1919.

SUBMARINE MINES.

STATEMENTS OF MAJ. GEN. F. W. COE AND CAPT. GEORGE RUHLEN, JR.

Mr. SLEMP. Gen. Coe, the matter of submarine mines is under your jurisdiction, is it not?

Gen. COE. Yes, sir.

SUBMARINE MINES, NETS, ETC., UNITED STATES.

Mr. SLEMP. The item for the purchase of submarine mines and nets and necessary appliances to operate them for closing the channels in the principal seaports and for continuing torpedo experiments calls for an appropriation of \$528,650.

MINE PROJECTS, LONG ISLAND SOUND AND CAPE HENRY.

Gen. COE. That item may be subdivided into two subitems. One of them is for a mine project for Long Island Sound, involving generator sets, anchors, mine cases, transformers, and anchor ropes, a total of \$406,000. We have placed that item in class C; in other words, it has been withdrawn by the authority of the War Department.

While there are possibilities of mining Long Island Sound, the experiments which we have conducted to date are not sufficiently satisfactory to warrant asking for this appropriation. It is necessary, in order to successfully mine the sound waters, to use a type of mine which automatically moves up and down in order to maintain itself at the necessary depth to be effective. We have such a type of mine developed, but it is not entirely satisfactory. The second portion of the item was for Cape Henry, including operating boards and conductor cable, \$122,650. We have also placed this item in class C. That is withdrawn from consideration.

Mr. SLEMP. In regard to the money on hand, you had appropriations in deficiency act of June 15, 1917, of \$2,926,330 and in the

deficiency act of October 6, 1917, \$700,000, making a total of \$3,626,330 as of October 6, 1917. What is the balance on hand?

Capt. RUHLEN. We have that in two different statements, one the no-year or regular appropriation and the second the deficiency act of June 15, 1917.

Regular appropriation, "Submarine mines, A," balance on hand February 29, 1920, \$704,279.59; obligations outstanding \$703.74; amount available, \$703,575.85.

I have it for each of the various items. Do you wish me to give it as we come to them?

Mr. SLEMP. So that for the purchase of submarine mines and nets and necessary appliances, for the balance of this fiscal year and for the next fiscal year you feel you have a sufficient amount on hand to take care of all necessary projects?

Capt. RUHLEN. I will give you the details on that. The status of the appropriation, deficiency act of June 15, 1917, balance, \$356,893.97; obligations outstanding, \$32,343.27; net amount available, \$324,550.70. Of the two amounts, we contemplate spending \$720,760 during the remainder of the fiscal year.

Mr. SLEMP. Leaving to revert to the Treasury at the end of this fiscal year?

Capt. RUHLEN. Approximately \$307,000.

NOTE.—Since the date of the hearing it has been learned that about \$30,000 will be required for cable-testing apparatus for new mine planters recently launched. This reduces the amount that probably will be turned into the Treasury to about \$277,550.70.

Mr. SLEMP. Now, Gen. Coe, you have not obligated this \$700,000 you propose to spend between now and the end of the fiscal year, have you?

MANILA BAY PROJECT—AUTOMATIC ANCHORS.

Gen. COE. We have obligated or approved the purchase of material which will leave \$725,000 available at the end of the year. We ask the committee's authority or congressional authority, if necessary (although probably congressional authority could not be obtained in time) for the expenditure of \$205,000 of this \$725,000 for the purchase of automatic anchors for the Manila Bay project, for which we have not an available balance.

Mr. SLEMP. Does that come under the classification of mines or nets?

Gen. COE. That comes under the classification of submarine mines and nets and necessary appliances to operate them. But this appropriation for submarine mines is carried, as are the other appropriations, in three different places in the bill and in each case under three different heads; so that this appropriation we are considering is for the continental United States only. And there are also similar items for the insular possessions and for Panama.

Mr. SLEMP. You could turn back approximately \$700,000, and you wish to have \$200,000 reappropriated for these anchors in Manila Bay?

Gen. COE. That would be another way of accomplishing the same result.

Mr. SLEMP. There is no vital necessity, so far as any emergency is concerned, for the purchase of those now or during the next fiscal year, is there?

Gen. COE. No; there is not.

Mr. SLEMP. And you have no contracts?

Gen. COE. No; no contracts.

Mr. SLEMP. Then unless reappropriated the money would lapse?

Gen. COE. No. And we can not expend this balance, and we never have spent that balance for the purchase of material which goes either to Manila Bay, Panama, or Hawaii, except possibly in the case of minor items of supply, sometimes small items of supply, which we may have in the United States and possibly charged to this fund, that might be sent out there if suddenly called for.

Mr. SLEMP. Have you now a good supply of submarine mines and nets?

Gen. COE. Of mines; yes.

Mr. SLEMP. And necessary appliances in the continental United States and spares?

Gen. COE. Yes, sir. The project is complete.

Mr. SLEMP. You will discuss Panama and Hawaii under their heads?

Gen. COE. Under their heads; yes.

Mr. SLEMP. But you want a special appropriation for these anchors for Manila?

Gen. COE. For Manila; yes.

Mr. SLEMP. Has the Army, in connection with the Coast Artillery and other coastal-defense organizations, worked out a coordinate relation with the Navy with regard to mines along the coast?

Gen. COE. Yes, sir. All mines which are planted and which are controlled from the shore are under the Army's jurisdiction and all of the mine fields which are not controlled from the shore are planted and maintained by the Navy.

Mr. SLEMP. What is the extreme limit to which you go from the shore in placing mines?

Gen. COE. There is no such figure. That is altogether a local question and it depends upon the configuration of the ground underwater and how the mine field must be laid. There are certain general considerations that have been adopted by the General Board of the Navy regarding mine fields, the entrance to the channels, and so on, and we confirm to them in all cases. The project is always gone over before being sent to Washington by the local Coast Artillery and the local naval commanders, so that both are in thorough accord as to the satisfactory nature of the project and they also have definite information as to what it is.

Mr. SLEMP. Then it goes to the joint Army and Navy board?

Gen. COE. Then it comes to Washington and goes to the joint General Staff and then to the joint board. The joint board does not change any project which is adopted by the local authorities, provided it conforms, in their opinion, to the requirements laid down by the General Board.

SUBMARINE MINE MATÉRIEL, UNITED STATES.

Mr. SLEMP. The next item is for purchase, manufacture, and test of submarine-mine matériel and other accessories for submarine mine practice, including the machinery necessary for their manufacture.

Gen. COE. That is for mine practice, \$9,000.

Mr. SLEMP. Have you any money on hand?

Capt. RUHLEN. Yes, sir. The balance of the regular appropriation, February 29, 1920, was \$34,922.06.

Mr. SLEMP. It is planned to turn that money back into the Treasury and have a reappropriation of \$9,233?

Capt. RUHLEN. Some of this money will be expended during the coming year for mine practice, but a large portion of that will be turned back.

Mr. SLEMP. Can you give an estimate of what you expect to turn back to the Treasury? You feel it is necessary to have that practice, I suppose, as a matter of training?

Gen. COE. Oh, yes.

Mr. SLEMP. You would not destroy much material of any kind, would you?

Gen. COE. We always have mine practice, and it is necessary to destroy material in order to have the practice—a very small amount.

Capt. RUHLEN. We can probably turn back \$30,000.

Mr. SLEMP. You would want about \$4,000 or \$5,000, I suppose, instead of \$9,000, if that is the case.

Gen. COE. We may spend \$4,000 between now and June 30, and during the next fiscal year our regular allowance, which has ordinarily been utilized, practically always, that is \$9,200.

Mr. SLEMP. The next item?

MAINTENANCE OF SUBMARINE MINE AND NET MATERIAL, UNITED STATES,
AND PURCHASE OF MACHINERY, TOOLS, ETC., FOR TORPEDO DEPOT, FORT
TOTTEN, N. Y.

Gen. COE. For maintenance of submarine mine and submarine net material within the limits of continental United States.

Capt. RUHLEN. The status of the appropriation: Regular appropriation, net amount available February 29, 1920, \$8,018; deficiency act of June 15, 1917, balance, \$73,995.55; obligations outstanding, \$6,833.30; net amount available, \$67,162.25. Total of the two appropriations, \$75,180.25.

Mr. SLEMP. Of which, how much is obligated?

Capt. RUHLEN. Six thousand eight hundred dollars is obligated at present.

Mr. SLEMP. And you would have to revert to the Treasury about \$67,000?

Capt. RUHLEN. No, sir. There would revert to the Treasury about \$15,000; that is, in the maintenance item.

Gen. COE. How much is now obligated?

Capt. RUHLEN. Now obligated, \$6,800, out of the total of \$75,000.

Mr. SLEMP. You do not propose to expend fifty-odd thousand dollars between now and the 1st of July, do you, in this maintenance?

Capt. RUHLEN. We do not expect to spend that much, but we probably will expend a large amount of that.

Gen. COE. Our regular maintenance appropriation has been, for a number of years, \$68,000. About half of that is for maintenance of the office force.

Mr. SLEMP. And the repair shop at Fort Totten?

Gen. COE. Yes, sir; and maintenance of the office and repair shop force.

Mr. SLEMP. You wish \$34,000, then?

Gen. COE. Yes, sir; for maintenance only. And that is largely for personnel. No, I am wrong in my figures. \$50,900, and the purposes of this are salaries and wages of employees, hardware, supplies, lumber, electrical material and supplies, acids, oils, and paints. We are not intending to purchase any of the cable replacements which we have annually been purchasing heretofore.

Mr. SLEMP. Do you have a largely-increased force of employees?

Gen. COE. No; it has not been changed at all, I think, between 1919 and 1921. There has been an increase of one storehouse keeper and one packer at the depot.

Mr. SLEMP. Apparently, \$18,000 is about the amount of money you have been spending each year on these nets and cables?

Gen. COE. Yes, sir.

Mr. SLEMP. Have you spent any money on the repair shop at Fort Totten or do you expect to this next year?

Gen. COE. Yes, sir; we maintain the repair shop there all the time and do a great deal of repair work. Requests are sent in from all over the country for repairs constantly.

Mr. SLEMP. You would charge the maintenance of that depot to this appropriation?

Gen. COE. Yes; and also material such as acids, oils, and paints, which is a constant item of maintenance.

EXTRA DUTY PAY TO SOLDIERS.

Mr. SLEMP. The language referring to extra duty pay to soldiers necessarily employed for periods not less than 10 days in connection with the issue, receipt, and care of submarine mine material at the torpedo depot; and for torpedo depot administration. Is that phraseology necessary to have in the bill?

Gen. COE. Yes, sir.

SUBMARINE MINE MATÉRIEL, INSULAR POSSESSIONS.

Gen. COE. The next will be for the insular possessions, the same three items.

Mr. SLEMP. For purchase of submarine mines and nets and necessary appliances to operate them for closing the channels leading to seaports in the insular possessions, \$82,400. What is the explanation of that item and have you any money on hand out of previous appropriations?

Capt. RUHLEN. The status of the appropriations, February 29, 1920: Regular appropriation, balance, \$239; Deficiency act of June 15, 1917, balance \$8,000. All of that will be expended in the very near future.

Mr. SLEMP. That brings you up to July 1 then with no money to return, and you are asking for \$82,400.

DETAILS OF ESTIMATE.

Gen. COE. That is for the purchase of steel-wire rope, \$38,300; 19 conductor cable, \$21,000; mine transformers, fuses, plugs, and so forth, \$21,400; marlin-covered rope, \$1,700.

Mr. SLEMP. Is this the same type of material, General, that you would use for similar purposes in continental United States?

Gen. COE. Exactly so.

Mr. SLEMP. Have you investigated the supply of this material on hand over here to see if some of that could be sent over there for use in the insular possessions?

Gen. COE. The only surplus we have results from the dismantling or the abandonment of the three mine projects which I mentioned to you just a few moments ago, and it will take all of that to fill out and complete the Chesapeake Bay project and some of the other projects which have certain deficiencies; that is, we have no surplus or no material surplus of mine material in this country over our requirements.

This will complete the mine project in Manila, and it will complete it with the old type of anchor. It will not give us the automatic anchor, model 1916, which is a real essential for the efficient planting of that group. That I mentioned to you as we went over the other proposition.

Mr. SLEMP. Have you any supply of the particular kind of matériel that you are asking for already over there? I am trying to get at the relation of what you ask to the reserve in the Philippines.

Gen. COE. This is a comparatively small proportion of the total mine project.

NOTE.—To date \$730,063.83 has been spent for submarine-mine material at Manila Bay.

Mr. SLEMP. Was there any mining matériel salvaged from overseas?

Gen. COE. Of course, that comes under the Navy, and does not apply to controlled mines at all. There were no controlled mines, or practically none, involved over there, and as to the salvage operations I could not answer.

MAINTENANCE OF SUBMARINE-MINE MATÉRIEL, INSULAR POSSESSIONS.

Mr. SLEMP. The next item is for the maintenance of submarine mines. You turned back last year \$30,000, and this year you ask for \$6,530. This is more or less an office matter—for stationery, drafting supplies, etc. Have you any money on hand?

Gen. COE. This is the same item we had before and is exactly for the same purpose, and in this country is spent at Fort Totten.

Mr. SLEMP. Have you any money now on hand?

Capt. RUHLEN. Balance on February 29, 1920, regular appropriation, \$5,413.96.

Mr. SLEMP. How much have you spent and how much do you expect to spend this year?

Capt. RUHLEN. We expect to spend all of that this year, and have spent out of the balance that was available on the 1st of July, 1919, about \$18,000.

Mr. SLEMP. Can you get along this next year with \$6,000?

Capt. RUHLEN. We can get along with the amount we are asking for, \$6,500.

ALTERATION, MAINTENANCE, AND REPAIR OF MINE MATÉRIEL, PANAMA CANAL.

Mr. SLEMP. The next item is:

For alteration, maintenance, and repair of submarine-mine matériel, \$4,138.

Gen. COE. That is \$4,138. There is also an item that we withdraw in the middle of the page:

For purchase of submarine mines and nets and necessary appliances to operate them for closing channels leading to the Panama Canal, \$371,000.

The net defenses developed by the Allies during the war were fairly satisfactory, so far as my knowledge goes. We had all of our important harbors protected with nets on the Atlantic coast.

Mr. SLEMP. So we have a good supply of submarine nets and appliances in the United States and insular possessions?

Gen. COE. We have certain supplies, and the question as to the installation of the nets is now under discussion with the Navy Department.

Mr. SLEMP. For 1918 you had \$250,000 for this purpose. Have you any money on hand?

Capt. RUHLEN. Yes, sir.

Mr. SLEMP. How much?

Capt. RUHLEN. The balance on hand February 29, 1920, regular appropriation, \$227,656, with no outstanding obligations. Deficiency act of June 15, 1917, balance, \$92,559.57; outstanding obligations, \$9,530.71; net amount available, \$83,028.86; or a total of \$310,684.86.

Mr. SLEMP. Gen. Coe, what is your attitude with reference to that amount of money?

Gen. COE. To turn back everything that is possible. I should have prepared myself on just exactly what we expected to spend out of this during the next six months, and I will do so next year, but I do not know exactly what the plans are. I only know that my policy is to only buy what is absolutely necessary. I will put a statement about that in the record.

Statement of submarine mine appropriations under control of chief of coast artillery.

Appropriations.	Balance on hand Mar. 1, 1920.	Probable expenditures during remainder of fiscal year 1920.	Probable amount to be turned into Treasury June 30, 1920.
Submarine mines:			
A.....	\$703,575.85	\$703,575.85	.....
A, act June 15, 1917.....	324,550.70	47,000.00	¹ \$277,550.70
B.....	8,018.00	8,018.00	.....
B, act June 15, 1917.....	67,162.25	52,000.00	15,162.25
C.....	34,922.06	15,000.00	19,922.06
No. 1, insular.....	239.00	239.00	.....
No. 1, insular, act June 15, 1917.....	8,000.00	8,000.00	.....
No. 4, insular.....	5,413.96	5,413.96	.....
A, Panama.....	227,656.00	82,000.00	² 145,656.00
A, Panama, act June 15, 1917.....	83,028.86	3,000.00	² 80,028.86
B, Panama.....	228.35	228.35	.....
B, Panama, act June 15, 1917.....	9,397.35	4,000.00	5,397.35
Total.....	1,472,192.38	928,475.16	543,712.22

¹ Since the date of the hearing it has been learned that about \$30,000 will be required for cable testing apparatus for new mine planters recently launched. This reduces the amount that probably will be turned into the Treasury to about \$277,550.70.

² Funds will not be expended for the purchase of the Panama project out of these balances, but certain experiments will be undertaken for the purposes explained to the subcommittee by the Chief of Coast Artillery. Amount to be expended, \$75,000.

Capt. RUHLEN. The indications at present are that we will spend \$2,160 of that amount.

Mr. SLEMP. General, you are not taking any chances so far as material is concerned with regard to submarine mines, nets, and necessary appliances at the Panama Canal?

Gen. COE. Absolutely not.

Mr. EAGAN. You will turn back then under this item about \$300,000?

Capt. RUHLEN. Yes, sir; but this \$300,000 is included in the \$700,000 mentioned by Gen. Coe.

NOTE.—Further investigation indicates \$75,000 of this \$300,000 will be required for experimental purposes.

WEDNESDAY, MARCH 24, 1920.

SIGNAL CORPS.

STATEMENTS OF MAJ. JAMES G. ANTHONY AND CAPT. A. BLISS ALBRO.

Mr. SLEMP. What position do you occupy?

Capt. ALBRO. I am finance officer of the Signal Corps.

Mr. SLEMP. And present some estimates in the bill?

Capt. ALBRO. Yes, sir.

OPERATION AND MAINTENANCE OF FIRE-CONTROL INSTALLATIONS AT SEACOAST DEFENSES IN UNITED STATES.

Mr. SLEMP. The first one is for operation and maintenance of fire-control installations at seacoast defenses. You have asked for \$174,330?

Capt. ALBRO. Yes, sir.

Mr. SLEMP. You had, last year, \$150,000?

Capt. ALBRO. Yes, sir.

Mr. SLEMP. What is the state of your funds now?

Capt. ALBRO. The balance in that appropriation—that is, the Treasury balance—at the present time is \$95,637.47. Contracts approved by me—that is, orders approved by me—at the present time amount to something over \$65,000 that have not been withdrawn from the Treasury as yet. The appropriation will be entirely gone at the end of the year. We could use more, but we will have to quit.

Mr. SLEMP. We will start, then, with a clean sheet as of—

Capt. ALBRO. July 1, 1920; yes, sir.

Mr. SLEMP. I would like you to insert in the record or state just how you disposed of the \$150,000 this year.

Capt. ALBRO. We are preparing that now. The reason for this increase of \$24,330 is simply the average increase of 40 per cent in the cost of materials. That is the only reason. The maintenance of the fire-control installations for seacoast defenses is merely the maintenance of the nervous system of those defenses. That is all I have to say in regard to it. If the seacoast defenses are to be maintained the fire-control installations have to be maintained. As it has run along, if you will notice, the increase has not even kept pace with the increased cost of materials. The reason why we have been able to stay within the \$150,000 this year, even in face of that in-

creased cost of materials, is because we have used up our reserve stock.

Mr. SLEMP. Your advice would be against building up a reserve on account of the changes that have taken place in manufacture?

Capt. ALBRO. I would not favor too extensive a reserve.

Mr. SLEMP. It would just be adding things that would begin to be obsolete as soon as you got them?

Maj. ANTHONY. As a matter of fact, I do not believe a large reserve is very vitally necessary in the United States, because it is so easy to get them. Of course, in Panama and the Philippines we should have a reserve, and in the Philippines they do have a reserve at the present time.

Mr. SLEMP. What about these submarine cables that you purchased? Do you do much of that now?

Maj. ANTHONY. The submarine cables are supplied by the Signal Corps. They are maintained by the Coast Artillery. New installations are installed by the Engineer Corps.

Mr. SLEMP. But you do the purchasing?

Maj. ANTHONY. We do the purchasing; yes, sir. And this year we have been particularly fortunate, as I do not know of over one or two cases where a submarine cable went out during the winter, wherein year before last I recall cases of about half a dozen. Of course, we had a severe winter two years ago and this year a mild winter.

Mr. SLEMP. How does the cost of those submarine cables compare now with the cost in 1915, 1916, and 1917?

Maj. ANTHONY. The cost of the paper cable—by paper I mean the conductor insulated by paper—has gone up from 40 to 50 per cent in the smaller sizes. When we get into the larger sizes (by that I mean from 100 to 200 pair cables), I have not the exact figures on those, but I think the price would be anywhere from 60 to 75 per cent more. And for the rubber cable, of course your price goes away out of sight.

Mr. SLEMP. Which ones do you favor generally?

Maj. ANTHONY. We endeavor wherever possible to use straight paper insulated cable.

Mr. SLEMP. That is the cheapest?

Maj. ANTHONY. That is the cheapest; yes, sir. Capt. Albro just spoke to you about the price of material going up 40 per cent—

Capt. ALBRO. Yes; the average through the list.

Maj. ANTHONY. We have some items that have gone up 100 per cent.

Capt. ALBRO. Telephone parts and stuff of that kind, easily.

Maj. ANTHONY. And time interval bells.

Capt. ALBRO. Time interval bells is another item.

Maj. ANTHONY. Zone firing signals have gone up about the same, and special head sets, made for use at batteries, so the concussion will not interfere with the taking of firing data. Three years ago we used to get them for \$11.50 apiece, and we are fortunate to-day if we get them for \$22 apiece.

Capt. ALBRO. \$22.75 I think was the last quotation.

Mr. SLEMP. Of course some things, such as cells, you have to replace; but where it is telephones and so on they ought to have some life.

Capt. ALBRO. But there is continual maintenance all the time, as you will see from the average figures.

Maj. ANTHONY. They do last, Mr. Chairman, but there are parts that give out. For instance, a transmitter button on the telephone is one of the first things to give out and when you get around the coast fortifications you are subject to bad climatic conditions.

DETAILS OF ESTIMATE.

Mr. SLEMP. In a general itemized way, for what would you spend this \$174,000?

Capt. ALBRO. It is itemized right down below, sir; a general itemization.

Maj. ANTHONY. Under those different headings there are probably 700 or 800 items.

Mr. SLEMP. You show an item of incidental expenses, \$45,000. You would hardly call that an itemization?

Capt. ALBRO. We will say that covers purchasing all the other kinds of materials. That is emergency purchases they make. We prefer to have them use their purchase organization rather than using the purchase organization of the office of the Chief Signal Officer.

Mr. SLEMP. How does this \$20,000 for the purchase of submarine cable and cable reels compare with the ordinary expenditure for that purpose?

Capt. ALBRO. That is, I think, the same as the expenditure this year; maybe a trifle more. Except the slight increase in this estimate of \$20,000, of 25 or 30 per cent over last year, on account of the increased cost of material.

Mr. BYRNS. I believe you stated you can get by this year without a deficiency, although you would have to call on your reserve?

Capt. ALBRO. Yes, sir.

Mr. SLEMP. In your hearing last year Mr. Good asked you:

What is the condition of the stock now?

Maj. ANTHONY. I consider our stock to be in very good shape.

Maj. ANTHONY. That was true at that time, Mr. Chairman, but now the material has been used for new work and it has not been replaced.

Mr. BYRNS. Will you be able to replace any of it if this full appropriation is allowed?

Maj. ANTHONY. Of \$174,000—I think we would; yes.

Mr. SLEMP. You did not have much loss of those submarine cables and reels on account of accident during this winter, and would you not be able to cut that item down somewhat for next year?

Capt. ALBRO. No; because this year's appropriation is gone, plus a certain amount of surplus stock we have used up from last year. And if the cables had gone out last winter, then we would have been facing a serious condition right now.

Mr. SLEMP. What I meant was, you are estimating \$20,000 to replace cables, and no cables went out.

Capt. ALBRO. If they go out next year we would have to replace them; if we did not, there we are. That is the point. But we have not any cable right now, because we have used it up this year. The

submarine cable has not gone out, but we have used quite a good deal of it in other work.

Maj. ANTHONY. When I say going out, I mean carried out or damaged by storms.

Capt. ALBRO. There has been a replacement due to cables going bad, deteriorating; but there has not been any great storm or emergency demand.

Mr. BYRNS. Do you have any particular trouble in cables not standing up under normal conditions?

Maj. ANTHONY. A cable's life in a conduit, for instance, where it is not disturbed and hauled around, will last anywhere from 10 to 15 years under normal operating conditions. However, every cable installed in the air, or aerial cables, where there is a continuous vibration from the wind, for instance, in the manufacture it is very necessary that the lead sheathing be properly puddled, because there is a mixture in the lead to give the lead sheath some body; and if by any possible chance, for instance, antimony should happen to gather in one particular spot, it will congeal in a very short time, due to vibration, a break occurs and the moisture goes through and penetrates the paper, giving what we call a short circuit or ground.

Mr. OGDEN. Did I understand you to say you had a deficiency appropriation?

Capt. ALBRO. For the Signal Service of the Army; not for the fire control.

Mr. SLEMP. Did you have any trouble with cables from shipping off the seacoast last year?

Maj. ANTHONY. As I recall from memory now, Mr. Chairman, there were two cables pulled up by anchors in Baltimore Harbor

Mr. SLEMP. By Government vessels?

Capt. ALBRO. Commercial vessels.

Mr. SLEMP. They pay for them?

Maj. ANTHONY. Wherever we can fix the responsibility, if they have disregarded the anchorage areas, we go after them through the Department of Justice and try to make them pay the bill themselves; but very often they pull the thing up and make a get-away and there is no way to tell who pulled it up.

Mr. SLEMP. You have to replace the cables and take your chances?

Maj. ANTHONY. Yes; from this maintenance fund.

Capt. ALBRO. This generally takes place in a storm or in a fog, where we can not discover the identity of the vessel. The same thing occurred up in New York Harbor with a telephone cable a few weeks ago. We saw the vessel, but could not discern the identity of it.

Mr. OGDEN. Your reserve stock in the Philippines, you say, is about normal?

Capt. ALBRO. In the Philippines; yes, sir.

The next item is under insular possessions.

OPERATION AND MAINTENANCE OF FIRE-CONTROL INSTALLATIONS AT SEACOAST DEFENSES IN INSULAR POSSESSIONS.

Capt. ALBRO. No increase is asked, because we just have our reserve stock to maintain in the Philippines and it has not been disturbed. We ask for no increase, although we are facing an increased

cost of materials; still our reserve is in such condition we will get through.

Maj. ANTHONY. We had only one cable go out in the Philippines. That happened to be in the signal service, not fire control, a 20-mile cable that went out in the Philippines. There it is storms and the terrific tides that go in and out, as the bottom of the bay is rocky and causes damage at unexpected times.

Mr. SLEMP. Do you keep in reserve there a good supply of these telephone parts and cable parts?

Maj. ANTHONY. We have a very good reserve in the Philippines at the present time.

Mr. SLEMP. What is the value at the present time of your reserve?

Maj. ANTHONY. The reserve is valued at \$26,000.

Mr. SLEMP. Have you added to that each year.

Maj. ANTHONY. Not from this fund; no, sir.

Mr. SLEMP. This \$25,000 estimated for here is what you got last year. Have you used all of that up?

Capt. ALBRO. The balance on March 16 was \$6,833.49. That is the Treasury balance. There are orders placed at the present time to the amount of about \$2,000, leaving \$4,833.49 for the ensuing three months of the fiscal year, which, at the present rate of expenditure, will just about be sufficient. We might have a balance of \$150 or \$200; I can not say right now.

Mr. SLEMP. There has been little variation in the operation and maintenance of fire-control stations there. In 1911 you had \$20,000. Then it dropped down in 1915, 1916, and 1917 to \$10,000.

Capt. ALBRO. The \$25,000 just carries us through. You say this new installation dropped to \$10,000 in 1914, 1915, 1916, and 1917; in all probability it was not connected with the Army. We had new installations in Oahu and all through there, and it did not require so much maintenance.

Maj. ANTHONY. I can probably answer a little more specifically, and I believe the records of last year will bear me out, as I recall now, in saying one particular requisition from the Philippines (which it usually submits annually on account of the distance away and the length of time it takes to get material) was a little over \$26,000. I do not know whether it has been noticed in this estimate or not, but this is \$25,000 to take care of the Philippines and the Hawaiian Islands, and there are four posts in the Hawaiian Islands and five in the Philippines. I believe they were never segregated until a year ago. In other words, this \$10,000 you just mentioned was to maintain both the Philippines and the Hawaiian Island. So with the statement I have just pointed out here of the \$26,000 requisition from the Philippines it can very readily be seen that only about half was to maintain fire-control installation.

Mr. SLEMP. In answer to that, you stated a year ago as follows:

The annual requisitions which the Philippines usually submit total about \$26,000, but this year the requisitions were under that, amounting to probably \$16,000 or \$17,000.

So that is \$10,000 under this amount you mentioned.

Maj. ANTHONY. That left the Hawaiian Islands. That \$16,000 requisition is for the Philippines only.

Mr. SLEMP. If I were to ask you to itemize the proposed expenditure for the Philippine Islands, \$15,695, and also the Hawaiian Islands, \$6,000, those two main items, would you be in a position to do that in dollars and cents, or would you rather say your experience justifies having that much money?

Maj. ANTHONY. It would be very much easier for us to say that our experience justifies us in having that much money, but we can itemize it. It would be quite a big job. As I say, there are about 800 or 900 items that are furnished.

Mr. SLEMP. You have several different things here. Local expenditures; district signal stations, including all radio and visual signaling equipment; submarine cables and reels; aerial and subterranean cable; post telephone system, permanent equipment only; fire-control apparatus, including telephone, time-interval, and meteorological equipment; power equipment, including generators, storage batteries, power switchboards, etc.—

Capt. ALBRO. Testing instruments and tools, construction and other expendable material, including wire, poles, dry cells, etc., and miscellaneous supplies and services not otherwise properly chargeable.

Maj. ANTHONY. I assume under fire control there are probably close to 200 to 300 items; and if we took into consideration the post telephone system, where we have to maintain every item of the post telephone switchboard, from the jack, plug, and plug seats, etc., we would get then 200 to 300 more items. And then we get into line material, the various makes of cable and different kinds of batteries and motor generators. So, as I say, if you itemize it, we would get into a myriad of things and it would take a week or two weeks to make it up.

Capt. ALBRO. I might say in that connection I have kept a record for the purpose of trying to get a budget system going on fire control, and I have kept a record of the items purchased for fire-control equipment during the past year, and it fills six draws of a card index file, which would give me to understand at the present time there are about 6,000 separate items we buy for fire-control installation.

Mr. BYRNS. What I do not exactly understand is the difference in the estimate submitted and past expenditures. You never had over \$15,000 up to the current year, when we gave you \$25,000. I notice prior to that, in 1919, you had \$15,000; in 1918, \$12,500; in 1917, 1916, and 1915, you had \$10,000, and then back of that \$20,000, when you say you had the installation fund. There is a jump of 250 per cent over what you had in 1915, 1916, and 1917.

Maj. ANTHONY. The installation would have no effect on the maintenance.

Mr. BYRNS. I take it the appropriations for 1911, 1912, and 1913 when you had \$20,000, included installation as well as operation and maintenance. I thought I understood you so to state.

Capt. ALBRO. No, sir; it did not.

Mr. BYRNS. And that you ceased to do that work in 1913.

Maj. ANTHONY. Yes, sir.

Capt. ALBRO. The appropriation used to be separate, just the same Mr. Byrns. Although we did the installation work, the appropriations were separate and, if I might be permitted to make the statement, the expenditures of the current year have been more carefully

watched, coming right after a war year, than any other appropriation. The chief has held me personally responsible for every nickel of Signal Corps money that has been spent, and I have had it watched very carefully, and I would say every requisition has had at least triple supervision before it reached our office and triple supervision after it reached our office, to see if some substitution could not be made or something done to avoid the expenditure of money. And with all that safeguarding of the public interests, the figures are as stated, \$6,833.49 balance out of \$25,000, with orders placed up to the amount of \$2,000 not yet withdrawn from the Treasury. And I think on that basis is the only safe way we can estimate what we need for the ensuing year.

Mr. BYRNS. You only have about \$4,000 unobligated?

Capt. ALBRO. Yes, sir.

OPERATION AND MAINTENANCE OF FIRE-CONTROL STATIONS AT SEACOAST DEFENSES, PANAMA CANAL.

Mr. SLEMP. The next item?

Capt. ALBRO. The next item is for the Panama Canal.

Mr. SLEMP. For the operation and maintenance of fire-control installations at seacoast defenses, 1921, \$15,000. You had, last year, \$10,000.

Capt. ALBRO. \$10,000. On March 16, the undrawn Treasury balance was \$6,954.04; the outstanding orders, \$3,600, in round numbers, leaving a balance of \$3,300, which will just about do. The reason why, in the present appropriation, there is such a large balance is on account of a couple of orders that have been held up which ought to have been put through two or three months ago, but I believe there is some trouble over inspection.

Mr. SLEMP. Do you feel that you will need all of the \$15,000 next year?

Capt. ALBRO. The estimate of the \$15,000 was prepared by Maj. Anthony. The main thing is in the \$5,500 item, which I will ask him to explain to the committee.

Mr. SLEMP. That is fire-control apparatus, including telephone, time interval, and meteorological equipment?

Maj. ANTHONY. Yes, sir.

Mr. SLEMP. Are we getting into Weather Bureau work there?

Capt. ALBRO. No, sir.

Maj. ANTHONY. It takes in the nature of Weather Bureau instruments.

Mr. SLEMP. We have weather stations down there?

Maj. ANTHONY. No, sir; not for fire-control purposes. The Coast Artillery make out meteorological observations, I believe, every half hour and from which data they make the necessary corrections in their firing data. That requires, of course, the use of certain meteorological equipment.

Mr. SLEMP. Is this \$5,500 item an entirely new proposition?

Maj. ANTHONY. No, sir; it is not. Fire-control apparatus includes telephones, time-interval, and meteorological equipment—the meteorological equipment being the minor part of the items listed. Due to the severe climatic conditions which exist in Panama—the

conditions there are worse than any place else where we maintain material—the district engineer in Panama has asked for a special design, or specialties to be incorporated in all fire-control equipment. Those changes are being made in the specifications at the present time, and once the specifications are completed all material of this nature, like fire-control telephones, fire-control head sets, and what are known as plotter sets, which are a modified form of telephone, telephones installed out in the open, will all be manufactured under these special specifications. The particular difficulty met down there is from humidity, which gets into all windings and coils and causes corrosion and, of course, with all of the metals used it causes rust. We are trying to get around that. We are impregnating all coils and eliminating the use of special dyes in the insulation material which is used for wrapping copper wires, etc., and with this change we have estimated it will take about \$2,500 additional to cover furnishing the equipment bought by the Coast Artillery for the maintenance of this system.

Mr. SLEMP. Are you going to maintain this coming year any more fire-control stations than you have had to maintain hitherto?

Maj. ANTHONY. I would have to refer to the Coast Artillery on that or the Engineers. I believe there have been at least one or two, possibly three, batteries completed in the last year.

Capt. RUHLEN. No, sir; two 12-inch batteries will be entirely completed this coming year and will have the fire-control stations.

Maj. ANTHONY. That will be additional maintenance work we would have to do in the post.

Mr. SLEMP. And you are allowing for that in this increased estimate?

Maj. ANTHONY. That increase was not figured; but I believe we can get by on it all right.

Mr. SLEMP. Do you say that same thing with regard to the items you previously discussed?

Maj. ANTHONY. About being able to get by with this new change of design?

Mr. SLEMP. No; that you would be able to get by with the request you have made, taking into consideration the maintenance of the new stations?

Maj. ANTHONY. Yes, sir.

Capt. ALBRO. The new stations will not take much maintenance the first year—there is the point—barring an emergency of some kind.

THURSDAY, MARCH 25, 1920.

ORDNANCE DEPARTMENT.

**STATEMENTS OF COL. J. H. RICE, CHIEF OF MANUFACTURE;
LIEUT. COL. O. J. GATCHELL; COL. G. F. JENKS; COL. J. H. PELOT;
COL. L. B. MOODY; COL. KING; COL. C. L'H. RUGGLES; LIEUT.
COL. K. B. HARMON.**

Mr. SLEMP. Col. Rice, we are ready to take up the ordnance items in the bill. Do you appear on behalf of those items?

Col. RICE. Yes, sir.

Mr. SLEMP. What position do you occupy in the Government service?

Col. RICE. I am Chief of Manufacture, Ordnance Department.

Mr. SLEMP. Do you desire to make a general statement on the subject? If so, the committee will be glad to hear from you.

GENERAL STATEMENT.

Col. RICE. So far as the ordnance activities are concerned, as related to appropriations and supply, the estimate is divided into the following general subheads:

(a) Conduct of experimental and research work of military character to the fullest possible extent, to the end that we may be prepared, upon the outbreak of a great war, to at once go into manufacture of types thoroughly tested both mechanically and in service, which shall be the equal of those of the other leading nations, if not their superiors.

(b) Repair, preservation, and maintenance of matériel and ammunition of existing standard types to the extent required by our approved preparation plans for war.

(c) To fill over a period of years such deficiencies as exist, including peacetime needs.

(d) To retain and maintain such facilities as are necessary to tide us over the period between exhaustion of stocks and new production by commercial agencies.

EXPERIMENTAL AND DEVELOPMENT WORK.

In reference to (a) above, experiment and development, its importance can not be overestimated. While it will cost considerable, the amount is negligible in comparison with the hundreds of millions spent during the World War, due to lack of sufficient preparation of this class. The committee can, I know, furnish examples from its own knowledge. Aside from the money expense, the difference in cost of human lives of our citizens is generally recognized to be very great. The length of a war and even its ultimate decision will be greatly affected.

We have on hand large quantities of military matériel and supplies, so that extensive manufacture for the purpose of increasing our present equipment is not necessary, judged by the standard of production established during the war, although there are some items which are short for any reasonable program. As a result of the war, however, it has been impressed upon us that much of the matériel which we have is not as good as that made by other nations, notably Germany. Many lessons have been learned as to the line that improvements should take, and it is essential that experimental work be undertaken promptly and carried on continuously, for sometime at least, if we are not to fall hopelessly behind the rest of the world in our military designs.

To fight with inferior weapons is surely a losing and heart-breaking thing and one that can be avoided by keeping at least abreast of the times in development.

For artillery and its ammunition an experimental program has been laid down and approved by the Secretary of War which is generally recognized as being the best in the world on this subject. Other boards have formulated or are formulating similar reports for their branches of the service. Consequently, carefully considered and approved programs embodying the lessons of the war are available, American training and ingenuity are available, facilities are in the main available. To make all this effective, we are asking appropriations for this class of work which have been carefully considered in many conferences at the War Department, and have been reduced below the original estimates by a total sum of \$3,500,000. I will put into the hearings detailed statements showing all reductions, if desired.

We have knowledge that other countries are proceeding energetically to put into concrete material the lessons they learned during the World War, even though they are in financial distress, and we must either fall behind or undertake this most reasonable class of insurance.

Work of this character is generally recognized as necessary and profitable in commercial life and is liberally provided for.

One large firm is known to have spent in 1917 \$1,099,000, and in 1918 \$1,854,000; another expends annually about 2 per cent of the value of sales of standard equipment; and the number could be multiplied indefinitely.

Maj. Gen. Sir Louis Jackson, who was during the World War in charge of England's offensive gas production and afterwards director of trench warfare and supplies, said in a paper read before the Royal United Service Institution of Great Britain December 30, 1919:

"It was quite clear that we were on the eve of the most extensive modification in the art of war known in history, and the changes made in the recent war were only the beginning. It was necessary to develop new arms, with the knowledge that the nation which best did so would have a great advantage in the next war."

An official London report says, referring to but one item of development:

"Generally speaking, the Tank Corps are very alert and looking forward to big improvements in tanks, and if they are able to get the necessary appropriations they will develop some exceptionally satisfactory tank designs. Their idea is that the horse is entirely doomed in future warfare and that tanks and tractors will be tremendous factors. They believe that all artillery will be handled by tractors in preference to horses and that rapidly moving tanks will entirely replace cavalry, and they speak freely of tanks that will operate at a speed of 12 to 20 miles per hour. In various tests on the model medium D tank they have developed 17 miles per hour across country on ordinary ground and 20 miles per hour on roadways, and they have often mentioned a higher speed than this, up to 25 or 28 miles per hour for light tanks."

Individual items will be taken up under each heading.

MOTORIZATION OF ARTILLERY.

Mr. SLEMP. The replacement of horses by motors in carrying the 75-mm. gun was not done during the war?

Col. RICE. It was in process, Mr. Slemp.

Mr. SLEMP. I mean that the war was won without motorizing the most effective Artillery arm of the service.

Col. RICE. It was won without motorizing the 75 mm.; yes, sir; but the motor business is comparatively new so far as concerns the present development of the caterpillar tractor.

Mr. SLEMP. As a general proposition, commercially and on the farm and elsewhere, your position is undoubtedly correct.

Col. RICE. And I want to add that we were energetically pushing the motorization of the 75 mm. when the armistice was declared, and that the horse went out of business on everything else over there as fast as we could purchase and deliver tractors. The general consensus of opinion throughout the whole American Expeditionary Forces was that the sooner they got rid of the horse and got mechanical equipment the better. I am introducing this, however, merely to illustrate the fact that the other nations are very widely awake to the need for experimental development.

The CHAIRMAN. Col. Rice, the use of the tractor on the large farms of the Northwest and in Canada is somewhat disappearing in those places where they have used them, because of their short life and large expense involved. Of course, in military operations where expense is not a factor or a controlling factor, I can see how a different rule would obtain; but the farm journals are now pointing to the fact that the idea is passing away of the tractor being used practically universally on the larger farms.

Col. RICE. I will have to differ with the conclusion of the farm journals, Mr. Good. I think the answer is that it is a temporary stage, so far as it exists, and that further improvement in the operation of the tractor, which is very rapid at the present time and reduction in cost, which will undoubtedly come with its increased use, will more than offset that.

Mr. SLEMP. If the oil supply of the world should begin to run down, you would have another problem on your hands.

Col. RICE. We would; yes, sir.

The CHAIRMAN. And Dr. Manning told us the other day in another subcommittee that as they view it now, the oil supply of the United States would be exhausted practically in 10 years; and if that is the case and you get your entire mobile artillery motorized about the time the oil supply disappears, what are you going to do with it.

Col. RICE. If that should unfortunately happen, of course, we will be in the same boat with a very great many large industries that are also using oil.

Mr. SLEMP. You were speaking about other nations in relation to motorization; no other nation went to motorization in Europe to the same extent that we did.

Col. RICE. No, sir. There were many reasons for that, however, which were entirely independent of the value of the motorization itself, and they are going to do it as fast as they are able to do so, I am sure.

REPAIR, PRESERVATION, AND MAINTENANCE OF MATÉRIEL.

As to subhead (b) above, it may be stated that we are now asking for \$5,000,000, which is a reduction of \$2,800,000. This does not include any reworking of powder to avoid its loss, as it is thought this may go over to another year so far as concerns appropriations.

With the large quantity of serviceable and nonperishable supply of matériel and the great amount of ammunition on hand, considerable appropriations will be necessary annually for maintenance in addition to that for our peace-time service.

DEFICIENCIES IN SEA COAST ORDNANCE MATÉRIEL.

In reference to (c): In spite of the war equipment remaining there are deficiencies in some lines, as, for instance, sea coast matériel, ammunition, and powder, the production of which was, of course, largely neglected during the war. There are also deficiencies in certain granulations of powder, in certain classes of special small-arms ammunition, in air craft armament matériel, etc. All funds now requested for new manufacture and for continuance of work on projects come under this heading.

MAINTENANCE OF MANUFACTURING FACILITIES.

As to (d), it may be said that the necessary facilities have been generally retained, but some are of such temporary character as to

render their upkeep unduly expensive. We are devising plans for changes which will, when completed, be submitted to the Congress, if approved by the Secretary of War. We are also endeavoring, where possible, to consolidate the manufacturing activities at the larger arsenals, viz, for new production \$23,780,000 and for continuation of work in progress \$5,681,000, and dispose of detached plants. The Congress has approved one such plan, and we propose to later suggest others. Such changes usually result in savings to the Government.

Mr. SLEMP. That is the plant out near the Dodge Bros. plant?

Col. RICE. Yes, sir; there has been an appropriation made by the Congress for the erection of a building at Rock Island Arsenal to take certain parts of the necessary equipment from the Dodge plant.

Mr. SLEMP. That has not been effectuated yet?

Col. RICE. No, sir; they have not yet been able to reach an agreement as to the sale of the Dodge plant, and the use of the \$450,000 is dependent upon the sale of that plant.

REDUCTION IN ESTIMATES.

The total amount submitted in the Book of Estimates for the Ordnance Department, including submarine mines, was \$91,549,239. Through conferences at the War Department and consequent change of plans this amount has been reduced to \$44,459,623, which is a total reduction of \$47,089,616. This total reduction is made up of the following items:

Experiment and development.....	\$3, 568, 440
Continuation of work in progress.....	3, 831, 300
New production.....	35, 674, 400
Maintenance.....	2, 874, 806
Proving grounds.....	363, 670
Submarine mines.....	777, 000

Detailed explanation of each item will, of course, be made under the proper headings.

I have a tabulation here which covers these original estimates and reductions not only as to totals under each of the headings I have given, but also under each appropriation. I think the committee would not be interested in having those figures given now, but if any of you care to examine them I will be glad to have you do so.

Mr. SLEMP. Col. Rice, before you go into the details of the bill, I thought the committee would like to have a general statement on the following subjects, and such other things as you might care to take up: First, a statement as to the amount expended on ordnance during the war separated by groups; second, the status of Government ordnance production facilities, kind and character, and those that are to be actively retained; third, the status of money left with the Government for settlement of claims with present balances thereunder, and the extent to which it has been used; fourth, the extent to which the fund was dipped into by the Ordnance Department in the armament of the various fortifications during the fiscal year 1920; and, fifth, the ordnance material on hand.

WAR ORDNANCE EXPENDITURES.

Col. RICE. As to the first question, a statement as to the amount expended on ordnance during the war, I will ask Col. Gatchell to give you the figures.

Col. GATCHELL. I can give you the total expenditure from June 30, 1917, to December 31, 1919, the grand total, including not only fortifications but everything. That figure is \$5,012,036,109.51. That is the total actual expenditure as reported by the Director of Finance, and that is divided up according to fiscal years, as follows:

For the fiscal year 1917, \$32,866,539.11; for the fiscal year 1918, \$1,366,502,660.44; for the fiscal year 1919, \$3,390,088,119.85; from July 1, 1919, until December 31, 1919; that is, this fiscal year, \$222,578,790.11. The summation of those figures gives the total which I mentioned previously.

Mr. SLEMP. This relates exclusively to ordnance?

Col. GATCHELL. Yes, sir; that is the entire ordnance. For that portion which applies only to the fortification acts the total is \$3,040,417.17. In your question, as I understand it, you ask for a general classification by groups. It is impossible for me to give you that by the subitems of the appropriations as the reports of the expenditures are not made up by the Director of Finance in that way, but we have had prepared in the Ordnance Office an analysis of our expenditures by a code which we prepared, and that analysis covered the period from April 6, 1917, until February 28, 1919. We had to strike a place to start the analysis. We have been working since that time in making this analysis. It was completed about a month ago. That was made under 12 general groups, and on the total of that amount I prepared a table which showed the percentage basis; that is, the first group was a certain percentage of the grand total, and as that amount was a very great portion—as you see the amount we have spent since February 28, 1919, is a very small proportion of the total.

Mr. SLEMP. Generally, what was that \$222,578,790.11 up to December 31, 1919, spent for?

Col. GATCHELL. Largely for settlement of claims and preservation of material coming back from overseas, taking care of it, storage, and cleaning up our war activities. Applying those same percentages, which I think is as fair a basis as we can take, since that was a very major proportion of the expenditures, I can give an estimated analysis by groups of how that money was spent.

Mr. SLEMP. For example.

Col. GATCHELL. For instance, my first grouping is for mountain, field, siege, and antiaircraft artillery, including the guns, mounts, carriages, caissons, optical, and fire-control instruments, repairs, replacements, tools, and accessories, and the plant facilities for their manufacture—that amounts to 10 $\frac{2}{10}$ per cent of the total, or \$546,311,934.90.

The next item is the ammunition for the mountain, field, siege, and antiaircraft artillery, including the plant facilities for their manufacture, which is largely armament of fortifications C as we call it, and that amounts to \$2,471,936,214.03, or 49.32 per cent of the total.

The third item is for seacoast artillery, including that for Panama and the insular possessions with their mounts, or fire-control

instruments, repairs, replacements, tools and accessories, submarine mines, radiodynamics, torpedoes, and plant facilities for their manufacture, representing 35 per cent, or \$17,542,126.35.

The fourth item is for ammunition for seacoast artillery, including plant facilities for their manufacture, representing 82 per cent, or \$41,098,696.02.

Mr. SLEMP. Are you confining yourself to this bill?

Col. GATCHELL. These first four items would come under the fortifications bill.

Now, of course, I wish to state that in making that analysis the difficulties have been tremendous. For instance, in the purchase of copper, it is my recollection that we purchased some \$30,000,000 worth of copper at one time, and that copper was used for shell and a thousand and one different things. We had to allocate the raw materials as best we could. These figures are estimates based upon our best judgment. The figures representing the total amounts actually expended were obtained from the Director of Finance and his disbursing officers and they should be very accurate. The allocation by groups represents our very best judgment.

Col. RICE. In connection with this statement that Col. Gatchell has just made, I would like to submit this statement showing the present value of the material and facilities on hand in the Ordnance Department as the result of war expenditures, as estimated, as follows:

Materials to be retained:

Ammunition	\$740, 599, 000	
Materials not including ammunition.....	763, 547, 000	
		<hr/>
Total materials to be retained.....		\$1, 504, 146. 000
Facilities to be retained.....	540, 655, 000	
Materials and facilities to be salvaged.....	350, 000, 000	
		<hr/>
Total materials and facilities on hand.....		2, 394, 801, 000

ORDNANCE DEPARTMENT MANUFACTURING PLANTS.

In regard to plant facilities, we have at the present time, including the old arsenals that we have retained, 14 plants.

The CHAIRMAN. Could not a statement be prepared in the form of a table, giving in one column the name of the manufacturing plant, in the next column the cost of the plant, with the amount added during the war; in the next column a statement showing the general character of the product; in another column a statement showing the number of men employed at present, and in still another column a statement of the number of men you propose to employ during the next fiscal year? And then, still another column might show the plants that will be retained and those that will be sold.

Col. RICE. Yes, sir; we can supply such a statement. In fact, we have all that information here. I will insert this statement [indicating] in the record, and will make such a table as you have indicated for insertion:

Statement of ordnance department manufacturing plants.

Name of manufacturing plant.	Total cost. ¹	Value added since Apr. 6, 1917.	General nature of product.	Number of men employed.		Is plant to be retained.
				At present.	Proposed for fiscal year.	
Rock Island Arsenal..	\$48,702,000	\$28,322,000	Mobile carriages, tanks, small arms, harness, and recuperators.	7,886	2,757	Yes.
Watertown Arsenal...	26,450,000	22,231,918	Gun forgings, railway and seacoast carriages, recuperators, castings and projectiles.	3,422	1,375	Yes.
Watervliet Arsenal....	12,164,878	10,733,485	Finished guns of all calibers.	2,423	748	Yes.
Rochester Gun Plant..	4,335,964	4,335,964	Rough machining and finishing 75 mm. guns.	² 9	12	Yes.
Erie Howitzer Plant..	5,226,000	5,226,000	Finishing 4.7-inch guns and 155 mm. howitzers.	² 10	12	Yes.
Detroit Recuperator Plant. ³	8,979,749	8,979,749	155 mm. recuperators.....	² 15	12	No.
Minneapolis Steel & Machine Co.	1,683,442	1,683,442	155 mm. gun carriages.....	(4)	.....	No.
Walter Scott Co.....	387,616	387,616	4.7-inch gun carriages.....	(4)	.....	No.
Buckeye Steel Castings Co.	234,124	234,124	Black gun forgings.....	(4)	.....	No.
American Rolling Mills Co.	184,801	184,801	155 mm. howitzer carriages	(4)	.....	No.
Osgood Bradley Co....	1,059,396	1,059,396	.....do.....	(4)	.....	No.
Morgan Engineering Co.	3,505,280	3,505,280	Railway mounts.....	(4)	.....	No.
New York Airbrake Co.	1,048,711	1,048,711	75 mm. carriage.....	(4)	.....	No.
Springfield Armory ..	⁴ 5,648,095	3,711,000	Rifles.....	2,737	800	Yes.
Frankford Arsenal....	⁴ 12,168,000	8,133,000	Ammunition and fire-control instruments.	2,372	1,050	Yes.
Rochester Automatic Arms Plant.	⁴ 2,586,000	2,586,000	Artillery ammunition, now used as storage for small-arms machinery.	30	4	Indefinite.
Remington Arms Union Metallic Cartridge Co. (cartridge plant).	1,500,000	1,500,000	.30 caliber cartridges.....	91	.....	No.
Savage Arms Co. (Government-owned portion).	2,431,000	2,431,000	Lewis machine guns .....	.....	.....	No.
Picatinny Arsenal....	6,971,291	1,251,060	Artillery ammunition component development.	807	337	Yes.
Old Hickory Powder Plant.	87,900,000	87,900,000	Smokeless powder.....	1,324	250	Yes.
Chicago Storage Depot.	16,984,262	16,984,262	Shells.....	839	30	Yes.
Amatol Arsenal.....	16,776,932	16,776,932	Shell, fuze and booster loading.	572	178	Yes.
Tullytown Arsenal....	7,154,000	7,154,000	Assembly of propelling charges.	116	57	Yes.
United States Nitrate Plant No. 1, Sheffield, Ala.	12,797,787	12,797,787	Ammonium nitrate.....	74	50-65	Yes.
United States Nitrate Plant No. 2, Muscle Shoals, Ala.	68,034,758	68,034,758	.....do.....	459	150-200	Yes.
Total.....	354,950,086	317,192,285	.....	23,186	7,822-7,887	

¹ The total cost as stated for the arsenals above does not include jigs, fixtures, and gauges stored at these arsenals.

² The figure for the number of men now employed at Rochester Gun Plant, Erie Howitzer Plant, and Detroit Recuperator Plant are for guard work only, the personnel for maintenance not being included. The corresponding figure proposed for the next fiscal year includes both guards and the average maintenance personnel required to take care of both the buildings and the machinery.

³ Congressional authority has been obtained to erect a recuperator shop at Rock Island Arsenal to take the place of the Detroit Recuperator Plant.

⁴ All plants which are to be sold, except the Detroit Recuperator Plant, are in the hands of the Salvage Board for disposition of machinery, equipment, and buildings.

⁵ The values given for Springfield Armory, Frankford Arsenal, and Rochester Automatic Arms Plant include salvaged equipment and machinery added or stored since the signing of the armistice.

USE OF BALANCES OF WAR APPROPRIATIONS.

Col. GATCHELL. Referring to your next two questions, the third and fourth, with your permission I would like to discuss No. 4 first. No. 4 relates to the extent to which funds were dipped into under armament of fortifications.

Mr. SLEMP. I want a specific answer to that, and we will go into it in detail in the hearing. I would like now to know the status of the appropriation.

Col. GATCHELL. I assume from that you would like to know how much money we have spent during this fiscal year, and how much we expect to spend during the remainder of the fiscal year from money left to us. I stated previously—although I did not go into the details previously under fortifications alone—from July 1, 1919, to December 31, 1919, we actually expended under the fortifications act \$164,158,115.98. During the remainder of the fiscal year we expect to spend from the fortifications appropriation approximately \$300,000,000. Gen. Rice has a statement covering the details and he can answer as to how the money has been spent.

Mr. SLEMP. That would come under each item of the bill?

Col. GATCHELL. Yes, sir. If you desire, we can give you an estimate of how we expect to spend this \$300,000,000. Before discussing the status of our money as it is now, I should like to make a little preliminary statement.

In considering the question of how much money the Ordnance Department would have to return to the Treasury on June 30 from fortifications appropriations, I wish to call your attention to some of the past history of this matter and some of the difficulties encountered.

During the war, when an order was placed for ordnance material, an allotment of funds to cover the amount of the contract was made to the disbursing officer, who would make payment. This was and is to-day our customary practice, and ordinarily, knowing the amount of the allotment made and the amount disbursed thereunder, it is a simple matter to determine how much is still to be paid.

However, at the signing of the armistice wholesale cancellations of the orders ensued, and this was done so rapidly that it was impossible to make the corresponding reductions of allotments. In fact, this was impossible for another reason in that we had no knowledge of how much would be necessary to meet claims. Thus, from the moment a portion of the contract was canceled, the allotment ceased to represent the money that was expected to be spent under that order.

WAR CONTRACT CLAIMS.

In December, 1918, very soon after the armistice the control of finances of the Ordnance Department was transferred to the office of the Director of Finance. That office, in an effort to meet the terms of the various recovery bills, communicated with the various disbursing officers to determine how much the various allotments could be reduced and still leave enough money to meet all expenditures under the contracts. The disbursing officers could not at that time determine accurately the amounts necessary to retain and very naturally, therefore, reported only the amounts they were sure they

could spare. These amounts were revoked from the allotments, which made the outstanding allotments come still further from representing the true amounts to be spent. In other words, they did not represent the original contracts and did not represent the amount that would be spent. They were arbitrary figures.

Mr. SLEMP. Based upon the 15 per cent reservation?

Col. GATCHELL. Yes; we had reservations to meet these claims of about 15 per cent.

In due time the approximate amount of claims became known and the problem soon sifted down as to how much remained to be paid on the uncanceled portions of war contracts.

To make this clearer, let me illustrate: Assume a contract for 100,000 rifles at \$30 per rifle. The total allotment therefor would be \$3,000,000. The armistice comes and the order is reduced to 50,000. The contractor at this time has delivered 40,000 and has been paid for same the amount of \$1,200,000. There still remain 10,000 to be delivered, which will involve \$300,000. With respect to the canceled 50,000 the contractor has bought machine tools, raw materials, etc., which constitute a claim against the Government of, say, \$400,000. The difficult thing for us to obtain was how much still remained to be spent on the 10,000 rifles not canceled.

This is a simple case and many were much more involved. We have been working in conjunction with the Director of Finance some months on this problem and the figures which I have here are the result. We have communicated with all the disbursing officers and believe we have approximate figures as to how much remains to be disbursed. Our method of procedure in determining how much the surplus will be has been to take the Treasury balance and from that deduct all expected expenditures from claims, old contracts, current contracts, etc. Many contracts had to be considered and necessarily the totals are estimates.

I have here a tabulation which I wish to insert in the record, and from that you will note that the total expected surplus—and I think the sum will surprise you—is \$793,019,544.11. That is the amount we expect will be available to turn into the Treasury from armament of fortifications on June 30 of this year.

Mr. SLEMP. Have all the claims been filed with the board?

Col. GATCHELL. Yes, sir.

Mr. SLEMP. What percentage of them has been adjudicated?

Col. GATCHELL. I think 99 per cent of the claims have been passed upon by the district claims board, but they have not been passed on in Washington. In almost every case, however, if there is any change from what the district claims board finds, it is in the nature of a reduction made in Washington. Therefore, the figure I am giving you of the money to be paid on account of outstanding claims and unpaid awards is an outside figure and should be less rather than greater. We have taken into consideration a few claims which have not been adjudicated at the full face value of the claims, and they probably will be less.

Mr. SLEMP. When you speak about the adjudication of claims, an agreement has been made by both parties to the claim, the Government on one side and the claimants on the other, that they will not be coming before the Court of Claims or before Congress for additional money.

Col. GATCHELL. There will be some cases of that kind. There will be the cases of manufacturers who did not comply with the law by getting the claim in on time, where their only recourse will be to submit it to the Auditor for the War Department or come and get special legislation. Those, however, will represent a very small percentage of the claims.

Mr. SLEMP. Does your statement have the indorsement of the Claims Board?

Col. GATCHELL. These figures here come from the Claims Board.

Mr. SLEMP. And of the Director of Finance?

Col. GATCHELL. Yes, sir.

Mr. SLEMP. And of the Chief of Ordnance?

Col. GATCHELL. Yes, sir; as to every figure on which we have based this estimate. I have not depended entirely upon my own records in preparing the estimates.

Mr. SLEMP. Then, Congress would take no risk in any way in returning that sum of \$793,000,000 to the Treasury on June 30, from the reservation made in 1918?

Col. GATCHELL. Congress has already by legislation made all of these appropriations expire as of June 30, 1920, and they are not subject to further obligations. By law they are not subject to expenditure for the next fiscal year.

Mr. SLEMP. But this \$793,000,000 you will not expend?

Col. GATCHELL. That is our estimate, that \$793,000,000 could be returned at that time. At the present time we have \$250,000,000 clear on our books.

Mr. SLEMP. That you can return now?

Col. GATCHELL. We would rather not return that much now, as we would like to keep some for emergencies. I am giving you the status of our balances.

ARMAMENT OF FORTIFICATIONS.

PURCHASE, MANUFACTURE, AND TEST OF MOUNTAIN, FIELD, AND SIEGE CANNON (UNITED STATES).

Mr. SLEMP. Col. Jenks, you speak for armament of fortifications B?

Col. JENKS. Yes, sir.

Mr. SLEMP. In your original estimates you asked for \$15,141,200. State what this is for and also the state of your balance.

Col. JENKS. The Treasury balance on March 18, 1920, under A. of F. B. was \$314,483,883.51. The unallotted, free balance was \$51,817,518.69.

Mr. SLEMP. Have you allotted all you expect to allot during this fiscal year?

Col. JENKS. No, sir. There will be, under this appropriation, approximately \$1,200,000 to be allotted which has not yet been allotted.

Mr. SLEMP. Leaving a net balance, not free balance, at the end of the fiscal year of what sum?

Col. JENKS. I can give you the estimated balance at the end of the fiscal year. That will be different.

Col. JENKS. The outstanding claims under this appropriation are \$35,903,216. The balance due on war contracts is \$26,957,188. The disbursement on projects which were current at the beginning of the fiscal year, will be \$22,278,397. Miscellaneous administrative expenses, \$1,945,000. Transportation, \$3,662,848. That makes a total of \$90,746,649.

The estimated free balance under this appropriation on June 30 is \$214,574,994.

The Treasury balance consists of approximately \$90,000,000 which is estimated as required to close out claims, war contracts and current operations, etc., and the remainder which has been obligated against the Treasury will be returned to the Treasury from the district offices and from other sources.

Mr. SLEMP. It comes out of the \$314,483,833?

Col. JENKS. Yes, sir.

The CHAIRMAN. I understood you to say, in round numbers, there was a \$314,000,000 balance on March 18?

Col. JENKS. Treasury balance; yes, sir.

The CHAIRMAN. And you had a free balance, unobligated, of \$51,817,518?

Col. JENKS. Yes, sir.

The CHAIRMAN. And now you have stated that on June 30, you will have a free balance of \$214,000,000?

Col. JENKS. We expect to have a free balance of \$214,000,000.

The CHAIRMAN. Where are you going to get the difference, if you only have a balance now of \$51,000,000?

Col. JENKS. We expect to get back, from allotments and reservations, sufficient to make \$314,000,000.

Mr. SLEMP. In other words, that allotment was made some time ago in expectation of settling claims, and you will get out better than you thought?

Col. JENKS. Yes, sir. We expect to cancel allotments included in that \$314,000,000 and get back a sufficient amount to bring the Treasury free balance up to \$214,000,000.

The CHAIRMAN. Why have you not realized something on those expectations so that you would show more of a free balance now, if you know that well enough to say that on June 30 there will be \$214,000,000 free balance?

Col. JENKS. We are realizing all the while on those. We have been taking up the appropriations one by one and realizing on the funds not required. That work is in process now. For example, under one appropriation, my division alone has recently canceled about \$20,000,000 of allotments and we are now in process of canceling allotments not required under this appropriation.

Mr. SLEMP. As a matter of fact, even part of the \$90,000,000 you may find you can return?

Col. JENKS. That is possible; yes, sir. That is merely an estimate and it is very difficult to estimate exactly, on account of existing conditions of organization and also of the condition of the contracts upon which we are working. There are uncompleted contracts and it is difficult to estimate exactly what is required.

Mr. SLEMP. Your statement is consistent in a general way with the statement made by the Director of Finance?

Col. JENKS. Yes, sir.

Mr. SLEMP. And he is aware of your testimony here?

Col. JENKS. Yes, sir.

Mr. SLEMP. Give us the reduced estimate.

Col. JENKS. The original estimates submitted under B were \$15,141,200. The estimates have been reduced to \$11,682,360. These estimates consist of the following main subdivisions: There is development work, \$5,805,760; continuing production on material in process, \$725,000; new production \$5,151,600—a total of \$11,682,360.

DETAIL OF ESTIMATE.

Mr. SLEMP. Give a statement in detail under each of the general heads.

Detail of estimates.

Development and experimental work:

Field artillery guns, howitzers, etc.....	\$2, 958, 000
One 8-inch 50-caliber railway gun and mount.....	155, 000
One 16-inch howitzer railway mount.....	250, 000
One 14-inch gun railway mount.....	200, 000
Cannon for aircraft.....	40, 000
Tractors.....	1, 231, 360
Service tests of field guns and caterpillars.....	250, 000
Test of tractors.....	721, 400

Total.....	<u>5, 805, 760</u>
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Continuing production:

Twenty-two 14-inch guns.....	625, 000
Jigs and fixtures.....	100, 000

Total.....	<u>725, 000</u>
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New production:

Twelve 14-inch railway gun mounts.....	3, 000, 000
Motor equipment for field artillery.....	2, 151, 600

Total.....	<u>5, 151, 600</u>
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Grand total.....	<u>11, 682, 360</u>
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Col. JENKS. Under the first, development work, one item is experimental work on artillery material to the amount of \$3,563,000.

Mr. SLEMP. What do you propose to make with that?

Col. JENKS. It consists of the design and development of designs of artillery material and the manufacture of pilot material for proving-ground tests.

Mr. SLEMP. What pilot material do you propose to make and how much money is set aside on that?

Col. JENKS. We have, under experimental material, 28 items. The first item is a light field gun and carriage, 75-millimeter material. The estimates submitted include \$150,000 for this purpose.

Mr. SLEMP. That will be six of those?

Col. JENKS. No, sir. We have already started on the development—

Mr. SLEMP. Suppose you just put in a list, one right after the other, before you discuss it.

Col. JENKS. The next item is a 75-millimeter light field gun of caterpillar mount. There is a carrying on of development work and construction of pilots of two different types or models of 75-millimeter caterpillar material and the inauguration of work on an additional type after the preliminary test of those two.

To go back, the first item is for the development of four types or models and the manufacture of eight pilot materials of those four designs of 75-millimeter material—guns and carriages. That is \$150,000. Work on three types is now under way.

The next item covers \$125,000 for the continuation of work on two types of caterpillar mounts for 75-millimeter guns and manufacture of four pilot materials and the inauguration of work on a third type.

These total costs, I may say, are approximate estimates made several months ago and will of necessity be departed from. The amounts given are for work during the next fiscal year, and do not represent the total cost of the pilot material enumerated.

The next item is for 105-millimeter howitzer mobile material and covers the completion of the design and manufacture of three types of material and the manufacture of six pilot mounts and the inauguration of work upon a fourth type—\$150,000.

The next item is for 105-millimeter howitzers on caterpillar mounts and covers the completion of design of two types of caterpillar materials and manufacture of four pilot mounts and the inauguration of work upon a third type—\$125,000.

The next item covers work on the design and manufacture of pilots of two types of 4.7-inch gun materials and the manufacture of four pilot mounts—amount, \$175,000.

The next item covers the completion of two types of caterpillar material for 4.7-inch field guns, amount \$135,000, and the inauguration of work on another design.

The next item covers the completion of one design and two pilot mounts and work on an additional design and two pilot mounts, 155-millimeter howitzers, to the amount of \$175,000.

The next item covers the work on two types of caterpillar mount for 155-millimeter howitzer and the inauguration of work on another design, two pilot mounts for each design—amount, \$135,000.

The next item covers the completion of one design of 155-millimeter gun mount and the manufacture of two pilot materials and inauguration of work on a second design and pilot materials—\$200,000.

The next item covers the completion of work on one type of 155-millimeter gun caterpillar material, and the inauguration of work on one additional type and the manufacture of the pilot material—amount, \$150,000.

The next item covers the completion of the design and construction of two pilots for 8-inch howitzer and mount, and the inauguration of work on a second type and pilot materials—\$200,000.

The next item covers the completion of work on 8-inch howitzer, caterpillar mount, and the construction of pilots and the inauguration of work on a second type—\$100,000.

The next item covers work on the development and construction of pilot caterpillar material for 194-millimeter gun, \$150,000.

The next item is the completion of design and construction of pilot of 240-millimeter howitzer caterpillar material, \$160,000.

The next item is the completion of pilots now under construction for infantry accompanying gun and howitzer, of which there are four, and work on probably two additional types—\$48,000.

The next item is the completion of work on two types of 75 millimeter mountain-gun material, and the inauguration of work on a third type; amount, \$40,000.

The next item covers development and design and work on two pilots, guns, and caterpillar mounts for 3-inch antiaircraft material—\$160,000.

The next item covers the completion of design and construction of pilot on two designs of 4.7-inch antiaircraft guns and caterpillar mounts and the inauguration of a third design—amount, \$150,000.

The next item covers the inauguration of design and the manufacture of one pilot, caterpillar mount, for 6-inch seacoast gun, \$110,000.

The next item is miscellaneous development work to the amount of \$100,000. That is miscellaneous material of minor natures and there is no definite manufacturing program fixed under that item.

The next item is the development of fire-control material for the mounts mentioned above and for accessory fire-control instruments—amount \$60,000.

The next item is the work on design and the manufacture of two pilots of 6-inch trench mortars, \$20,000, and inauguration of a second type.

The next item is a study of the auto frettage method of the manufacture of guns, covering a program of about six different calibers of guns, \$75,000.

The next item is for experimental ordnance engineering work, for studying the interior ballistics, \$35,000.

The next item is a study of the cold-shrinkage methods of assembling guns, \$20,000.

The next is work on experimental steel, \$10,000. The next item is the completion or the design and pilot railway material for 8-inch 50-caliber gun, including the manufacture of a pilot gun, \$155,000.

The next item is completion of the design and manufacture of one pilot, railway mount, for a 16-inch seacoast howitzer of new design, \$250,000.

The last item is for the completion of manufacture of a pilot mount for 14-inch railway gun, \$200,000.

The total amount is \$3,563,000 for artillery. There is an additional amount of experimental work for the development of tractors which would be better covered by Col. Moody.

Mr. SLEMP. The amount estimated for that is \$1,231,360?

Col. JENKS. Yes, sir; and there is a small amount of \$40,000 for the development of bombardment cannon for aircraft use.

Mr. SLEMP. How much did you expend on this experimental development work during this fiscal year; that is, what will it amount to up to June 30?

Col. JENKS. During the present fiscal year we have spent and expect to spend on the items mentioned above \$2,116,000 for artillery matériel only.

Mr. SLEMP. Where you mention completing the project of a gun and so on: Does that mean completing work begun during this fiscal year under your estimate of last year?

WESTERVELT BOARD.

Col. JENKS. Yes, sir; under funds set aside by the War Department for work under the Westervelt Board project this year.

Mr. SLEMP. Of course, the Westervelt Board project has never been submitted to Congress and never been indorsed by Congress?

Col. JENKS. No, sir.

Mr. SLEMP. So that you do not mean in your statement to commit Congress to a recognition of all the recommendations of the Westervelt Board, do you?

Col. JENKS. No, sir.

Mr. SLEMP. Right in that connection, you had better state what the Westervelt Board is; how it got its origin, etc.

Col. JENKS. After the armistice there was a board of officers appointed by the War Department to study artillery in use in our own service and in the allied service in order to make recommendations as to the policy of the War Department in the future development of artillery matériel and in order to incorporate, in our matériel and in our designs of matériel, the experiences obtained by our service during the past war.

The board consisted of Artillery and Ordnance officers and is commonly known as the Westervelt Board, its president being Gen. W. I. Westervelt. This report was approved by the Chief of Staff on May 23, 1919, and constitutes the program and policy on which the Ordnance Department is working in the development of designs of matériel.

Mr. SLEMP. The War Department is not working on that plan in advance of its submission to Congress, are they?

Col. JENKS. The estimates submitted last year covered development of matériel along the same lines, but that was omitted from the appropriation bill on the ground, as reported by the chairman of the subcommittee to the House, that the funds available would be sufficient for carrying on necessary work.

Mr. SLEMP. But you should bear in mind this statement by the Chief of Ordnance:

Gen. WILLIAMS. * * * The estimate is \$7,432,025, and under that I want to make an immediate cut. There is one item of \$1,120,025 in there for completing existing projects for bodies for ammunition trucks, trench mortars, and howitzer trailers. I want to cut that item out.

Mr. BYRNES. That will reduce it to what amount?

Mr. LEACH. \$6,312,000.

Have your expenditures during the entire fiscal year, under armament, fortifications B, been within the limit of \$6,312,000, as stated last year by the Chief of Ordnance?

CURRENT YEAR EXPENDITURES.

Col. JENKS. The amount expended and to be expended during the present fiscal year, exclusive of the completion of war contracts, including new production orders, experimental work, the salvage of machinery, which is in reality a clean-up of war work, and the installation of machinery at arsenals, which includes the replacement of worn-out machinery, is approximately \$8,000,000.

Mr. SLEMP. The summation of the items that you put in the class of exceptions—that is, over and above the \$8,000,000—that amounts to quite a lot of money, does it not; about how much?

Col. JENKS. There are the expenditures on closing out the war contracts, including the disbursements that were made during the present fiscal year for the payment of work done before the fiscal year, which amounts approximately to \$15,000,000.

Mr. SLEMP. Payments made this year for work done prior to this fiscal year are how much?

Col. JENKS. I do not know how much has been paid this fiscal year for work done prior to this fiscal year. That has been impracticable to determine. But for payment of work done before the fiscal year and for the carrying on of war contracts which were not completed until after the fiscal year the total is about \$15,000,000.

Mr. SLEMP. Do you remember your testimony, Col. Jenks, before this committee last year, in which you were asked about the work to be done? This is the hearing:

Mr. GOOD. To what extent is it proposed to do this work [referring to this development work] in the arsenals?

Col. JENKS. Practically all of it.

Mr. GOOD. Why could not that be done in place of the other work now being done there?

Col. JENKS. The other work of finishing up material is practically completed.

Mr. GOOD. It will soon be finished?

Col. JENKS. Yes, sir.

Mr. GOOD. Then, next year you will have nothing to do in the arsenals but to continue this work?

Col. JENKS. That could be done.

So the committee was under the impression last year that the total amount of money, practically, that would be used under this A. of F. "B" would be the six or seven million dollars here that the Chief of Ordnance said he needed, and the statement of the chairman of the subcommittee on the floor of the House was that you would dip down into this reserve or reserve fund and get that amount of money, and his statement on the floor ought not to be construed as inconsistent with the statements of the Ordnance officials before this committee.

Col. JENKS. The work in process that has been done at arsenals was divided into three classes.

Mr. SLEMP. I would rather you would not go into that right now.

Col. JENKS. That is an explanation of the activities of the arsenals.

Mr. SLEMP. You said last year the work was practically through and all that needed to be done was to go on with this experimental work, which you estimated would cost \$3,000,000; and if you added the salvage to that of \$3,000,000 you would get up to six or seven million dollars, whereas you spent many millions more than that.

Col. JENKS. The expenditure of the \$15,000,000, as I have stated I am unable to subdivide between the amounts which we expended before the fiscal year and the amounts which have been obligated during the current fiscal year. This amount, for example, of \$15,000,000 includes an item of \$3,000,000 for the manufacture of forgings for 155-millimeter guns and 240-millimeter howitzers. The manufacture of those forgings was stopped about a year ago, and the only thing allowed to proceed was the heat treatment on those on hand, in order to put them into condition to be used. I can not tell from the records

how much money has been spent on the actual heat treatment of the few forgings which were still at that plant on July 1, and I am carrying in this \$15,000,000 over \$3,000,000 on that particular contract.

Mr. SLEMP. You worked on 14-inch guns and expended money under this appropriation on 14-inch guns, did you not?

Col. JENKS. Yes, sir. We have carried on work on 14-inch guns which was inaugurated before the armistice.

Mr. SLEMP. And you continued the completion of about twenty-four 75-millimeter guns also, did you not?

Col. JENKS. Yes, sir; guns which were practically completed, with the exception of the last operations.

Mr. SLEMP. Even those 24 guns are not quite completed yet—they were not in February?

Col. JENKS. There is practically no work being done on them; there are just a few of what you might call hand operations, in order to put them in condition where they would be of some use to the service. There has also been work carried on——

Mr. SLEMP. Have you been working on any other guns or gun carriages other than the 14-inch guns and on the twenty-four 75-millimeter guns?

Col. JENKS. We have been working on the completion of some 155-millimeter guns and 240-millimeter howitzers and those that you have mentioned.

Mr. SLEMP. How many of those have you been working on to completion?

Col. JENKS. There were orders placed during the war at Watervliet Arsenal for about seven hundred and sixty 155-millimeter guns, in addition to those placed under contract. This order was reduced to 319 at the time of the armistice. I have not the figures with me as to the number actually shipped from Watervliet Arsenal at the beginning of the fiscal year, but the work on those has been the completion of that order of 319.

There also placed at Watervliet Arsenal during the war orders for one thousand one hundred and sixty 240-millimeter howitzers. Those were reduced, first, to 400, I believe, and later, about a year ago, to 330, which are being completed during this fiscal year. I have not the records as to the exact number that have been shipped.

Mr. SLEMP. Will both of those classes of guns, to the number you mention, be completed during this fiscal year?

Col. JENKS. Yes, sir. The total order will be completed by the end of this fiscal year.

Mr. SLEMP. Is that all of the kinds of guns you have been making this year—those you have mentioned? Did you make any 4.7 or 8 inch guns?

Col. JENKS. There may have been a few 4.7 guns shown on the records as inspected and completed this year, but there has been practically no work done on them.

Mr. SLEMP. Carriages either?

Col. JENKS. During the present fiscal year the 240-millimeter howitzer carriages have been finished up at Watertown Arsenal. That work was slowed down and spread out over the fiscal year. There has been work done on recuperators, both under contract and at the Rock Island Arsenal, for 75-millimeter gun carriages. There

has been work done on railway artillery during the fiscal year, both under contract and at the arsenals.

CONTINUANCE OF WORK ON GUNS UNDER MANUFACTURE.

Mr. SLEMP. I wish to call your attention to the fact that you had on hand an excess of two thousand three hundred and twenty-two 75-millimeter guns; that you had an excess of 4.7 guns, and this is based upon an Army, as I understand, of a million and a half, and perhaps more; that you had on hand of the 155-millimeter guns 993, and of the howitzers, 2,955, which is 1,836 more than needed.

Col. JENKS. That last figure is wrong.

Mr. SLEMP. Grand total available, in United States and France, 2,955.

Col. JENKS. You mean 155-millimeter howitzers?

Mr. SLEMP. Yes; two thousand nine hundred and fifty-five 155-millimeter howitzers.

Col. JENKS. Yes, sir.

Mr. SLEMP. Of which there is an excess on hand of 1,836. Now, of your 8-inch howitzers you have between five and six hundred, and of the 240-millimeter howitzer you had 330. I was wondering what the necessity was for the continuation of the production of this material under those circumstances.

Col. JENKS. The twenty-four 75-millimeter guns you speak of were so far advanced and the cost of completion was so small that it was a question either of spending a small amount and getting a finished gun, like the other guns we have in store, or else stopping work at an incomplete stage and storing the material in special condition, in a condition which was not available for use.

Mr. SLEMP. Of course, there could not be much objection to stopping when you stated you had an excess on hand of 2,322.

Col. JENKS. The difference in the cost of handling 24 guns in an incomplete stage and the cost of completing those would be in favor, I think, of completing them.

The CHAIRMAN. When completed they would not be of the standard that this board recommends, would they?

Col. JENKS. No, sir; they are the standard that now exists of the standard material of the service.

The CHAIRMAN. And the Westervelt Board practically condemns that standard.

Col. JENKS. That standard is recognized by artillerymen as not being the standard which the artilleryman would desire to go into a war with 10 or 20 or 50 years from this date, but it is the standard which the artilleryman recognizes he would go into a war with tomorrow or next year.

The CHAIRMAN. Because he has got them.

Col. JENKS. Because he has them.

The CHAIRMAN. But the Westervelt Board, as I glance through your report, in a measure condemns your guns because they are too light—designed for being conveyed by horse power rather than by motor power—and it would make them all heavier so as to get an increased range.

Col. JENKS. That report, sir, does not——

The CHAIRMAN. I submit it is rather technical and rather difficult for a layman to understand; but in the main I take it that it desires what it regards as an improvement over practically all the types of field artillery.

Col. JENKS. Yes, sir. That report does not condemn the material which we have at the present time for use as service material, but it does——

The CHAIRMAN. No; but only because it is available now, and the kind the board would like to have available has not been manufactured or designed. Now, the question Mr. Slemph was trying to get at was, With the surplus of this material on hand, even though you had a part of the material at the arsenals to manufacture more, why was it thought desirable to spend the money—when it was costing twice as much to make a gun now as before—to complete these uncompleted guns, of which type we had a surplus, and when completed would not be the kind you want to manufacture for the future?

Col. JENKS. It was a question, as I said, of spending a small amount to put this material into a condition for use or of storing material special, incomplete, in a condition in which it was not fitted for use. The cost of completing, with facilities, personnel, etc., on hand, was small in comparison with what it would cost to take up that work in the incomplete stage and handle it at some future time. And after studying the condition of that material it was decided to be in the interests of the Government to complete it and place it in store as a complete item.

Mr. SLEMP. Now, let us see how that line of reasoning works out.

Col. JENKS. I also wish to make a few remarks regarding the requirements as laid down by the table which the chairman has. Those requirements are those specified by the General Staff as required to equip an army of so many divisions and required to maintain that army in the case of 75-millimeter guns.

Mr. SLEMP. How many men does that involve?

Col. JENKS. The number of men based on the tables of organization that existed during the war would be approximately one and a half million men. Those tables of organization are based on special conditions which existed during the past war, in which it was recognized that the United States would need to supply infantry in large quantities; that it was incapable of manufacturing artillery in large quantities and lacked the facilities; that the Allies had large quantities of artillery material on hand and facilities for equipping our troops. In that connection I may mention, however, that during the Argonne operations the artillery in reserve was over double the organic material given in our organization table.

Mr. SLEMP. In your own statement there is an excess of 2,322 guns even under those circumstances you mention.

Col. JENKS. That is based on our war tables of organization of a small amount of artillery to a large amount of infantry and a six months' maintenance. Now to the officer who is responsible for supplying artillery, for the production of artillery, he must take a different point of view; and the question he asks is how much artillery must we have on hand in order to equip so many units of artillery, so many divisions, and to maintain that in service until

new production can be brought in from existing capacity and until new production can be built up from commercial facilities. Based on that study, we have no surplus of artillery.

The CHAIRMAN. When were the last orders for 14-inch guns placed?

Col. JENKS. Under date of November 30, 1918, a letter was written by the ordnance office to the War Department stating that certain guns and railway mounts were under manufacture. This letter included forty-two 14-inch guns and gave the status of the work at the time of the armistice. Exactly when those orders were placed I do not know, but they were placed before the armistice.

Mr. SLEMP. Can you give the delivery date of the forgings for the 14-inch guns at Watervliet Arsenal?

Col. JENKS. I have not that information here, but I can obtain it. I would like to state here that of the forty-two 14-inch guns, three complete guns were turned over by the Navy Department, and two complete guns, less the breach mechanism, were also turned over, and 12 sets of forgings.

Mr. SLEMP. What was the date of the turning over of the 12 sets of forgings?

Col. JENKS. From the date of the finishing order for the 12 sets of forgings placed at Watervliet Arsenal, which was August 5, 1918, I should say the delivery of some forgings was made at that time. The orders for the guns under contract, the 14-inch guns, were placed April 29, 1918.

Mr. OGDEN. Orders for how many guns were placed?

Col. JENKS. That was for fifteen 14-inch guns. Order for ten 14-inch guns which required forgings was placed at Watervliet Arsenal on April 4, 1918.

Mr. SLEMP. The forgings for about 15 of those 14-inch guns were delivered to Watervliet Arsenal after the armistice, I should say.

Col. JENKS. I have no record here of that.

Mr. SLEMP. At any rate, the completion of those guns was not based upon the fact that the work had gone so far that it could not have been stopped, but in the view of the War Department they needed the guns. I think that must have been the line of reasoning.

Col. JENKS. As a general proposition, I should say, yes; although that might not apply to each unit, because some units should have been so far advanced at the date of the armistice as to render it inadvisable to stop.

Mr. SLEMP. You are not proposing to-day to manufacture any entirely new guns?

Col. JENKS. Pilot material only.

Mr. SLEMP. Take your light field guns: Are you not manufacturing two light field guns now?

Col. JENKS. We are manufacturing more than that. We are manufacturing different types of light field guns.

Mr. SLEMP. You have two kinds—one of the wheel type and one with the caterpillar mount?

Col. JENKS. Yes, sir.

Mr. SLEMP. You are manufacturing two of those types that you call the pilot mount?

Col. JENKS. There are two of each type.

Mr. SLEMP. There are three types, are there not?

DEVELOPMENT OF MOUNTS FOR 75 MILLIMETER GUNS.

Col. JENKS. We have at the present time under development three different types of mobile mounts for 75-millimeter guns and two different caterpillar mounts for 75-millimeter guns. We have about four different types of 75-millimeter guns.

Mr. SLEMP. When will you get through with these types so as to produce the 75-millimeter mounts and the 75-millimeter guns?

Col. JENKS. There are several in which the design has been completed and production has been inaugurated up to this time. We hope to complete them next year.

Mr. SLEMP. Are you asking for some money now to complete them next year?

Col. JENKS. Yes, sir.

Mr. SLEMP. Do you expect to complete any of them this year?

Col. JENKS. I hope to, but I am not sure that we can make it.

The CHAIRMAN. Why do you commence to develop four different types before you finish the development of one type?

Col. JENKS. In those four different types the guns themselves, to the laymen, would be the same thing. They have the same exterior ballistics, but there is involved a study of different methods of construction and the use of different material in the construction, in order to determine the best method and the best material to be used in the construction of those guns.

The CHAIRMAN. It seems to me that the War Department has not sensed the purpose of Congress in these matters. You are laying out a broad field, and are dipping in with \$1,000,000 here, \$1,000,000 there, and \$10,000,000 somewhere else, whereas Congress has no intention of appropriating anything like the money in your first estimate or even in your revised estimate. The result is that you have scattered out all over the world in these matters. For instance, you have a report here, known as the Westervelt report, with two of the officers dissenting, and you are attempting to get out a type for each man's approved project. Going back to 1900, you had nearly \$5,000,000 for all the purposes of the coast defenses; in 1901, the appropriation was \$7,000,000, and so on down to 1906, when the appropriation was \$6,747,000. Then you dropped to \$5,000,000; you had \$6,000,000 in 1908; \$9,000,000 in 1909; \$8,000,000 in 1910; \$5,000,000 in 1911; \$5,000,000 in 1912; \$4,036,235 in 1913, just before the outbreak of the European War; and in 1914, the year of the outbreak of the European War you had \$5,473,707. In 1915 the appropriation was \$5,627,700; and in 1916, two years after the outbreak of the European War the appropriation was \$6,060,216.90. Now, you come here after the war, with a single project or one item, for which the original estimate was \$15,000,000, and which was subsequently reduced to \$11,000,000, and now you are asking for over \$5,000,000 for development purposes. If the War Department thinks that Congress will appropriate anything like that, they are working along the wrong line. It seems to me that, in view of the condition of the Treasury, if the War Department has not sensed the military proposition with any more accuracy, with regard to this modification, than they have the condition of the Treasury, as indicated in

these estimates, they are a long way from the facts from a military standpoint. Now, we are brought face to face with a condition here, and we have got to meet it. I am sorry the War Department is not showing some sympathy with the proposition of trying to help Congress to meet this situation. Certainly, we will not appropriate anything like \$5,000,000 for development work in this class of material and guns.

It must be apparent to every officer in the army, it seems to me, that that is out of the question. We are talking here as if we were strangers; yet we are all members of the same family, and we had as well realize at first as at last the condition that we are up against. It seems to me that instead of developing a whole lot of types the War Department should have picked out one type that is going to be the principal type and developed it, or else show that you could get something better and then come to Congress with it, showing what you had done in the development of that type. Then you would be in a position to ask money for the development of other types. As it is, you have scattered all over the field and have not gotten anywhere with your development work. It is idle to think that Congress will let you go ahead with that sort of scattering development work.

Col. JENKS. There is no one type of material that is used by an army. An army requires many kinds and classes of materials for its operations, and the number of types of material required by the army is increasing. No one can develop a satisfactory type of artillery matériel, or anything else, whether it is automobile or artillery matériel, or what not, without studies of that matériel on the drawing board and in the engineering office, and then in the actual building of models and in the testing of those models at the proving grounds and in the service. No one can say what type of matériel is the one that the service wants. The one that the service will want is the one that should be produced. That question can not be decided until various models of the matériel have actually been constructed and tested, and then, as a result of those models constructed and tested, we are able to say what matériel the service will want.

Mr. SLEMP. You have expended or will have expended for this purpose nearly \$3,000,000 this year, and yet you do not have a single complete model to test?

Col. JENKS. I have in my office wooden models of about five materials, and under funds which have been allotted there have been constructed and tested several different models already.

Mr. SLEMP. Where were they tested?

Col. JENKS. At Aberdeen.

Mr. SLEMP. What particular ones have you completed?

Col. JENKS. We have completed two different models of the infantry accompanying guns and we hope to complete this fiscal year one 75-millimeter gun and mobile mount and one 75-millimeter caterpillar mount.

Mr. SLEMP. You have not completed them yet and so far have not made the tests, but you are asking for additional money to make more types of that kind next year. You are asking that before you have made a test of what you are now producing.

Col. JENKS. In regard to the 75-millimeter guns, for example, the service sees many desirable characteristics in the 75-millimeter gun. The Westervelt Board in their report wanted, for example, in the 75-millimeter gun, 65° elevation and a wide traverse, with high velocity and long range. Those characteristics are being obtained at the expense of mobility. They also desire mobility and other important characteristics which require a different construction of the carriage. To obtain the great mobility, for example, what we call the box trail is required in place of the split trail. Before any decision can be reached as to what the ultimate development of that material will be tests must be made by the service of the different types.

RANGE OF 75-MILLIMETER GUNS.

Mr. SLEMP. I wish to place in the record this extract from the report of the Westervelt Board:

The consensus of opinion of all military officers—French, Italian, English, and American—was that the 75-millimeter gun, or approximately this caliber, firing a 15-pound projectile, or a projectile of approximately this weight, and having a range of not less than 11,000 yards, is a satisfactory weapon at the present time for use with division artillery. The projectile in question, whether a shrapnel or high-explosive shell, satisfies adequately the criterion of man killing.

The report goes on further to state:

The board is of the opinion that, except as to perfection of details, the limit of carriage design as expressed by the most modern type of box trail and split trail carriages has been reached.

Now, this says 11,000 yards, but your normal range is somewhere between 9,000 and 11,000 yards?

Col. JENKS. About 9,000 yards.

Mr. SLEMP. I understand with the new type of projectile it is more than 9,000?

Col. RICE. With the latest type of projectile it is that much.

Mr. SLEMP. It seems to me that you might rest on the report of this board of officers that you think so much of.

Col. JENK. That report also specifies the type of 75-millimeter gun to be developed; that is, one which has a range of 15,000 yards.

Mr. SLEMP. This says 11,000 yards.

Col. JENKS. But in another section of the report it gives the characteristics of the matériel which it recommends to be developed.

DEVELOPMENT OF GUNS AND MOUNTS, VARIOUS TYPES.

Mr. SLEMP. The other guns you propose are one 8-inch 50-caliber railroad gun and mount, \$155,000; one 16-inch howitzer railway mount, \$250,000; one 14-inch gun, railway mount, \$200,000. All of these come under the experimental development class, do they not?

Col. JENKS. In some stage of it; but they are not all in the same stage of development.

Mr. SLEMP. Is work being done on all of them now?

Col. JENKS. Not on all of them. For example, we are doing nothing on the caterpillar mount for the 6-inch gun.

Mr. SLEMP. Are you doing anything on your 8-inch railway gun and mount?

Col. JENKS. Yes, sir.

Mr. SLEMP. How far along is that work?

Col. JENKS. The design of the tipping part of the carriage has been practically completed. That is the first work, and the studies of the remaining parts of the mount have been practically completed.

Mr. SLEMP. How about the 16-inch howitzer railway mount?

Col. JENKS. That is being carried on with the design of the 14-inch railway mount, and the cradle is under construction.

Mr. SLEMP. The cradle for which?

Col. JENKS. For the 16-inch howitzer; and the 16-inch howitzer is also under construction for the mount.

Mr. SLEMP. Is this 14-inch gun and railway mount of a new type?

Col. JENKS. The 14-inch gun and railway mount represent a new type, consisting of a combination of the type developed before the war for the seacoast and the types developed during the war.

Mr. SLEMP. Is it different from any you have already made?

Col. JENKS. Yes, sir.

Mr. SLEMP. You have not gone into the construction of that?

Col. JENKS. That is under construction, or some of it.

Mr. SLEMP. You are making some cannon for aircraft also?

Col. JENKS. We are developing two calibers of antiaircraft matériel, one a 3 inch and one a 4.7 inch.

Mr. SLEMP. If you are not allowed any money at all for this experimental work for next year, would you have anything to show for what you have done this year that you could test out next year?

Col. JENKS. We would have two types of the infantry-accompanying gun, one or two of the 75-millimeter guns either completed or almost completed, and we would have the caterpillar mount for the 75-millimeter gun and the 105-millimeter howitzer, and possibly some others.

Mr. SLEMP. How about the 105-millimeter howitzer?

Col. JENKS. We hope to complete one type of carriage for that this year, and also to complete one type of the 75-millimeter mountain howitzer.

Mr. SLEMP. Is that an Italian gun?

Col. JENKS. No, sir; two types of infantry-accompanying gun were based on Italian guns.

Mr. SLEMP. Will you complete any of these 4.7 guns this year?

Col. JENKS. On the gun itself we will be a long way toward completion; on the recuperator we will be well advanced; but on the carriage proper we will not be so far advanced.

APPROPRIATIONS REQUIRED TO COMPLETE GUNS AND MOUNTS MORE THAN
50 PER CENT ADVANCED.

Mr. SLEMP. I wish you would put in the record a statement showing how much money will be required to complete the types that are more than 50 per cent completed this year?

Col. JENKS. I will do so.

Statement of new funds required to complete material under Westervelt Board program estimated to be more than 50 per cent advanced by June 30, 1920.

Project.	Item.	Estimated funds required to complete.
1. 75 mm. field gun and carriage.....	2 split trail carriages and 2 guns, 2 box trail carriages and 2 guns.	\$100,000
2. 75 mm. field gun on caterpillar.....	1 caterpillar, 2 mounts, and 2 guns....	25,000
3. 105 mm. field howitzer and carriage.....	As item 1.....	100,000
4. 105 mm. field howitzer on caterpillar.....	As item 2.....	25,000
5. 4.7-inch field gun and carriage.....	2 recuperators, 2 guns.....	40,000
6. 4.7-inch field gun on caterpillar.....	1 recuperator, 1 gun.....	30,000
7. 155 mm. field howitzer and carriage.....	2 recuperators, 2 howitzers.....	40,000
8. 155 mm. field howitzer on caterpillar.....	1 recuperator, 1 howitzer.....	30,000
9. 155 mm. gun and carriage.....	2 recuperators, 2 guns.....	100,000
10. 155 mm. gun on caterpillar.....	1 recuperator, 1 gun.....	50,000
11. 8-inch howitzer and carriage.....	2 recuperators, 2 howitzers.....	100,000
12. 8-inch howitzer on caterpillar.....	1 recuperator, 1 howitzer.....	50,000
13. Infantry howitzer.....	4 carriages, 4 howitzers.....	15,000
14. Pack artillery.....	2 carriages, 2 howitzers.....	20,000
15. 4.7 inch antiaircraft gun and caterpillar.....	2 recuperators, 2 guns.....	60,000
16. 8-inch 50 caliber gun railroad mount, 8-inch 50 caliber gun.	1 recuperator.....	8,000
17. 16-inch howitzer railway mount and howitzer.....	do.....	25,000
18. 14-inch gun railway mount.....	do.....	25,000
		863,000

NOTE.—In some cases components of matériel is shown as more than 50 per cent advanced, as per example, recuperators and guns. In such cases work on the remainder of unit matériel is less advanced. The components are not available for use without the completion of the remainder of the matériel.

DEVELOPMENT OF TRACTORS.

Mr. SLEMP. You are asking \$1,231,300 on account of tractors. Have you a list of the tractors?

Col. MOODY. I have that statement here. I have had a statement prepared along substantially the lines that Col. Jenks's statement was prepared as to artillery proper. I might say that this is following also exactly the Westervelt Board's program, which was approved by the Secretary of War.

If I may interpolate just one word as to the matter of figures, irrespective of the opinion of anyone as to whether these things should or should not be done, I would like to say that I obtained from six of the largest automobile companies and truck companies—and, of course, confidentially—a statement of the money that they expend each year for development work, with the average cost of each project. I found that the average number of new designs brought out by the six companies was 16 and that the total amount that they expended in experimental work was \$3,650,000, or an average cost, approximately, of \$228,000 per project.

Mr. SLEMP. During what period?

Col. MOODY. That is an annual expenditure.

Mr. SLEMP. Does not the Government get some benefit from awaiting the development of those tractors along commercial lines?

Col. MOODY. That is a point well worthy of consideration; but I thought that I might possibly answer some questions in advance by saying—

Mr. SLEMP (interposing). I would like to know how much money you have spent in the development of tractor

The CHAIRMAN. The figures you have just given represent expenditures made during the war on account of tractors likely to be used for war purposes here or abroad, do they not?

Col. MOODY. Partly. Those are figures that I simply wanted to introduce showing what the commercial concerns were doing.

The CHAIRMAN. It was during the war, was it not?

Col. MOODY. Both during the war and after the war.

The CHAIRMAN. Have you any figures like that showing what the commercial concerns were doing for the development of tractors, say, in 1914?

Col. MOODY. These are based, I believe, on what they were doing last year.

The CHAIRMAN. I understand that.

Col. MOODY. I have only one definite figure I know of. When the Whites built their first car—that was built long before the war—the designs were brought over from France, and knowing what they wanted, it cost them \$100,000 to get their first machine running. That is an informal statement from an official of the company. Our own figures during the war, so far as I can find, show it cost us about the same during the war as it is now costing; in other words, the average of what we did during the war was about \$235,000.

The CHAIRMAN. Colonel, can you put a table in the record showing the expenditure for development work by projects and types?

Col. MOODY. Yes; I have an exact detailed table.

The CHAIRMAN. That is, your books are kept in such a way that you know how much you expend on the development of each type?

Col. MOODY. Yes; during the war.

The CHAIRMAN. I mean during the past year?

Col. MOODY. Yes, sir.

The CHAIRMAN. Will you put in the record, then, a statement showing the expenditure of this \$2,000,000, by projects, during the past year—that is, what types you expended money upon; how much you expended on each type, in one column, the extent to which you completed the type; in another column the time it would take to complete your study; and in still another column the amount requisite to complete your study and the development of the type? All the way down show your expenditures out of this appropriation during the past year; and also what new projects it is proposed to do development work on during the next year out of this estimate; the amount it will cost on each project and the length of time it will take to develop each type upon which you propose to spend money, in addition to those you expended money on during the past year; and then we can see by looking at the table just what you have done and what you propose to do during the next year in the way of development work.

Col. MOODY. Yes; I think that can be done easily by a combination of two tables I have here. I will have to put it in a little different form.

Tractor and trailer development program.

Project.	Experi- mental types of ma- terial. ¹	Amount ex- pended or obli- gated to June 30, 1920 (esti- mated.)	Estimated extent of completion by June 30, 1920.	Estimated date of completion of project.	Esti- mated funds re- quired to com- plete proj- ect.
1. Tractor for divisional artillery.	4	\$70,000	First type, manufacture completed; second type, 50 per cent complete under contract.	June 30, 1922	\$150,000
2. Tractor caisson for divisional artillery.	2	45,000	Design 1 complete; manufacture of pilot, 25 per cent complete under contract.	.....do.....	155,000
3. Trailer caisson for divisional artillery.	4	10,000	Mgnufacture of one pilot vehicle completed and pilot 33 per cent complete under contract.	.....do.....	50,000
4. Improved type tractor for corps artillery.	2	45,000	Design complete; manufacture of pilot started under contract.	.....do.....	155,000
5. Tractor caisson for corps artillery.	2	45,000	.....do.....	.....do.....	155,000
6. Trailer caisson for corps artillery.	2	10,000	Manufacture of one pilot complete.	.....do.....	50,000
7. Improved type tractor for Army artillery.	2	45,000	Manufacture of one pilot started under contract.	.....do.....	155,000
8. Tractor caisson for Army artillery.	2	45,000	.....do.....	.....do.....	155,000
9. Trailer caisson for Army artillery.	2	10,000	Manufacture of 1 pilot 10 per cent complete under contract.	.....do.....	50,000
10. Tractor for especially heavy artillery.	2	50,000	Manufacture of 1 pilot 40 per cent complete under contract.	.....do.....	170,000
11. Tractor caisson, ½-ton capacity.	5	50,000	Manufacture of pilots for 2 types complete.	.....do.....	150,000
12. Tractor cart, steered by walking man.	5	35,000	Manufacture of a pilot of 2 types complete.	.....do.....	60,000
13. Hand-drawn caterpillar cart.	4	5,000	.....do.....	June 30, 1921	5,000
14. Wheeled trailer for transport of 4.7-inch A. A. mounts, etc.	1	10,000	Design 50 per cent complete.....	.....do.....	15,000

¹ Estimated number of, to be worked on to June 30, 1921.

Detail of proposed manufacture of Artillery tractors, tractor caissons, mobile shops, etc., in addition to experimental work.

[No work inaugurated during fiscal year 1920.]

No.	Item.	Num- ber to be made.	Purpose.	Unit cost.	Total cost.	Estimated date of placing order justified by experimental work.	Esti- mated expense and obli- gations, fiscal year 1921.	Estimated date of completion.
1	Tractor for corps artillery (5-ton).	12	Equipment of 1 battery for service test.	\$8,000	\$96,000	Mar. 15, 1921	\$96,000	Dec. 15, 1921
2	Tractor caisson for corps artillery (1½-ton).	6	Equipment of one-half battery for serv-ice test.	12,000	72,000	Feb. 1, 1921	72,000	Nov. 15, 1921
3	Trailer caissons for corps artil- lery (1½-ton).	6	.....do.....	6,000	36,000	July 1, 1920	36,000	Dec. 31, 1920
4	Tractor for Army artillery(10-ton).	12	Equipment of 1 battery for service test.	9,200	110,400	Mar. 1, 1921	110,400	Dec. 31, 1921
5	Tractor caisson for Army artillery (3-ton).	6	Equipment of one-half bat- tery for serv-ice test.	13,000	78,000	Nov. 1, 1920	78,000	June 30, 1921
6	Trailer caisson for Army artillery (3-ton).	6	.....do.....	6,500	39,000	Aug - - - - -	39,000	Feb. 28, 1921

Detail of proposed manufacture of Artillery tractors, etc.—Continued.

No.	Item.	Number to be made.	Purpose.	Unit cost.	Total cost.	Estimated date of placing order justified by experimental work.	Estimated expense and obligations, fiscal year 1921.	Estimated date of completion.
7	Tractor for specially heavy artillery (15-ton).	6	Equipment of battery for service test.	\$15,000	\$90,000	Dec. 1, 1920	\$90,000	Sept. 30, 1921
8	Tractor caisson (1-ton).	25	For service test replacing men and arrivals in handling small loads.	3,000	75,000	12, Aug. 1, 1920; 13, Nov. 1, 1920.	75,000	Dec. 31, 1920, to June 30, 1921.
9	Tractor cart steered by walking man.	20	.....do.....	2,000	40,000	10, Aug. 1, 1920; 10, Oct. 1, 1920.	40,000	Dec. 31, 1920, to Mar. 1, 1921.
10	Hand-drawn caterpillar cart.	20	.....do.....	500	10,000	10, Aug. 1, 1920; 10, Oct. 1, 1920.	10,000	Dec. 1, 1920, to June 30, 1921.
11	Heavy artillery mobile repair shop.	1	Equipment of 1 shop for service test.	75,000	75,000	July 1 to Oct. 31, 1920.	75,000	June 30, 1921
12	Complete motor equipment of latest type for regiment of light field artillery.	4	Equipment of 4 regiments in different climates and with different local terrain to definitely determining upon motorization for this artillery.	537,900	2,151,600	Sept. 30, 1920, to Jan. 31, 1921.	2,151,600	June 30, 1921, to Dec. 31, 1921.

DESCRIPTION OF TRACTORS.

1. Tractor for divisional artillery. A suitable tractor for divisional artillery does not now exist. Present experiments are toward the development of a tractor of about 2½-ton capacity, and indications are that this size will be perfectly satisfactory. Until a thoroughly satisfactory tractor of this type is developed it is probable that there will be no extensive motorization of the 75-mm. gun with large peace-time savings.

2. Tractor caisson for divisional artillery. This is a load-carrying caterpillar of about 1½-ton cargo capacity, the total weight of the vehicle being about 7,000 pounds, and is intended for the transport of ammunition for divisional field gun and howitzer, and similar cross-country work under battle conditions. No satisfactory vehicle of this type is now in existence.

3. Trailer caisson for divisional artillery. This is a caterpillar-type trailer of approximately 1½-ton cargo carrying capacity. It will be used for carrying ammunition for the divisional field gun and howitzer when towed behind the divisional tractor. No satisfactory vehicle of this type now exists.

4. Improved type tractor for corps artillery. The 5-ton tractor used during the war is a serviceable machine, but by no means represents the ultimate, and is not a type that would be desired to manufacture in a future emergency.

5. Tractor caisson for corps artillery. This is a load-carrying caterpillar type, weighing about 5 tons, and having a cargo capacity of approximately 3 tons. No satisfactory vehicle of this type now exists.

6. Trailer caisson for corps artillery. A caterpillar trailer for use with the 5-ton tractor. No satisfactory type exists.

7. Improved type tractor for Army artillery. The 10-ton tractor used during the war is a serviceable but not ideal machine and is not a type that it would be desired to manufacture in a future emergency.

8. Tractor caisson for Army artillery.

9. Trailer caisson for Army artillery. These are vehicles for the same purpose but of heavier type than described for corps artillery.

10. Tractor for especially heavy artillery. There is not now in the service a standard tractor of more than 10-ton capacity, and this is not of sufficient

capacity for drawing the heaviest types of field artillery that are now contemplated.

11. Tractor caisson— $\frac{1}{2}$ -ton capacity. This is a small cargo-carrying vehicle of the caterpillar type, of about $\frac{1}{2}$ -ton capacity, and is designed to replace the horse for individually mounted men where applicable to carry machine guns, etc. Its development is very important and should result in peace-time saving. No vehicle of this type now exists and it is a result of war experience.

12. Tractor cart steered by walking man. The tractor cart is a power-driven auxiliary vehicle which can be used in any arm of the service where special transport is required. It is a simpler and slower vehicle than the tractor caisson, $\frac{1}{2}$ ton, otherwise the same remarks apply.

13. Hand-drawn caterpillar cart. These carts are auxiliary vehicles without power plant which can be used in any arm of the service where special transport is required.

14. Wheeled trailer for transport of 4.7-inch antiaircraft mounts, etc. The heaviest trailer now in service is of 10 tons capacity, which is not sufficient for transporting a gun and mount as heavy as the 4.7-inch antiaircraft. It is extremely desirable in antiaircraft defense to provide a means for very rapid transport of the antiaircraft guns.

15. Improved types mobile repair shops. The experience of the war showed that certain minor features of the mobile repair shops should be changed, and this project provides for making of such changes.

16. Experimental and development work not specifically itemized. It is impossible to itemize all the individual projects which are incidental to the main projects listed above, and the funds requested herein are for the purpose of covering all such incidental expenditures. Important work now underway is the development of motors of about 60, 120, and 250 horsepower to adequately meet military needs, study of the oil-fuel situation and improvements in track mechanisms of caterpillar vehicles.

17. Light armor plate. With the increased power of the small arms armor-piercing bullets, it is absolutely necessary to provide better tank and tractor armor. The funds requested herein are for the purpose of experimenting with all types of armor to determine the ones most satisfactory for use in the service. This item also covers armor development for body protection, aircraft, gun shields, etc.

Artillery development program.

EXPERIMENTAL MATÉRIEL.¹

Project.	Number of types of matériel in project covered by funds in estimate for next fiscal year.	Estimated expenditures to June 30, 1920.	Estimated extent of completion by June 30, 1920.	Estimated date of completion.	Estimated funds required to complete project.
75-mm. field gun and carriage.	4	\$250,000	Split trail type nearly complete; Bethlehem type under design; box trail type under manufacture; fourth type not initiated.	June 30, 1923	\$300,000
75-mm. field gun on caterpillar.	3	75,000	Holt type complete; Christie type under manufacture; third type not initiated.	.....do.....	225,000
105-mm. field howitzer and carriage.	4	230,000	Split trail type complete; Bethlehem type under design; box trail type under manufacture; fourth type not initiated.	.....do.....	295,000
105-mm. field howitzer on caterpillar.	3	75,000	Holt type complete; Christie type under manufacture; third type not initiated.	.....do.....	225,000

¹ The estimates submitted during the hearings covered work on the types indicated in second column of table. This does not include all types which it is now estimated are required in the project. The work in any project will change according to the degree of success obtained in meeting service requirements in the earlier models. It is probable that this program can not be adhered to in all details, but it represents the present plan of this office.

The estimated dates of completion are contingent upon the same speed of work as now obtained. Projects enumerated include no work in the development of processes of manufacture of matériel in quantity nor any study of production methods nor any overhauling of designs to meet production requirements.

*Artillery development program—Continued.***EXPERIMENTAL MATÉRIEL—Continued.**

Project.	Number of types of matériel in project covered by funds in estimate for next fiscal year.	Estimated expenditures to June 30, 1920.	Estimated extent of completion by June 30, 1920.	Estimated date of completion.	Estimated funds required to complete project.
4.7-inch field gun and carriage.	2	\$40,000	Split trail type under manufacture; second type not initiated.	June 30, 1923	\$360,000
4.7-inch field gun on caterpillar.	3	30,000	First two types under manufacture; third type not initiated.	.....do.....	350,000
155-mm. field howitzer and carriage.	2	40,000	Split trail type under manufacture; second type not initiated.	.....do.....	360,000
155-mm. field howitzer on caterpillar.	3	30,000	First two types under manufacture; third type not initiated.	.....do.....	350,000
155-mm. gun and carriage.	2	105,000	Split trail type under manufacture; second type not initiated.	June 30, 1924	365,000
155-mm. gun on caterpillar.	2	150,000	First type under manufacture; second type not initiated.	.....do.....	400,000
8-inch howitzer and carriage.	2	105,000	Split trail type under manufacture; second type not initiated.	.....do.....	365,000
8-inch howitzer and caterpillar.	2	120,000	First type under manufacture; second type not initiated.	.....do.....	330,000
194-mm. or 8-inch gun on caterpillar.	1	25,000	Under manufacture.....	.....do.....	475,000
9.5-inch howitzer on caterpillar.	1	30,000	.....do.....	.....do.....	470,000
Infantry howitzer...	6	48,000	Ansaldo and Gueritore types complete; Types I and II complete; Type III under design; Type IV not initiated.	June 30, 1922	88,000
Pack artillery.....	3	58,000	First type complete; Bethlehem type under design; third type not initiated.	.....do.....	80,000
3-inch antiaircraft gun and caterpillar.	2	10,000	First type under manufacture, second type not initiated.	June 30, 1924	410,000
4.7-inch antiaircraft gun and caterpillar.	3	185,000	First and second types under manufacture; third type not initiated.	.....do.....	365,000
Caterpillar mount for 6-inch gun.	1	.....	Not initiated.....	June 30, 1922	300,000
General experiments.	.....	125,000	Several types of muzzle brakes and experimental recuperators have been tested or designed; others under design.	June 30, 1924	300,000
Development of fire control.	.....	50,000	Numerous types of sights and apparatus being designed, manufactured, and under test.	.....do.....	150,000
6-inch trench mortar.	2	5,000	First type under manufacture; second type not initiated.	June 30, 1922	40,000
Study of auto fretage.	.....	60,000	Various forgings and apparatus under manufacture.	June 30, 1924	175,000
Interior ballistics...	.....	.....	Theoretical investigation only.	.....do.....	85,000
Study of cold shrinkage.	.....	.....	.....do.....	June 30, 1923	70,000
Experimental steel.	.....	.....	Theoretical investigation and minor experiments.	June 30, 1924	40,000
8-inch, 50-caliber gun, railroad mount.	1	20,000	Under manufacture.....	June 30, 1922	200,000
8-inch, 50-caliber gun.	1		.....do.....	.....do.....	55,000
16-inch howitzer, railway mount.	1	150,000	.....do.....	.....do.....	300,000
16-inch howitzer...	1		.....do.....	June 30, 1921	
14-inch gun, railroad mount.	1	100,000	.....do.....	.....do.....	225,000

Artillery development program—Continued.

MANUFACTURE FOR SERVICE TESTS.

Project.	Number of types of matériel in project covered by funds in estimate for next fiscal year.	Estimated expenditures to June 30, 1920.	Estimated extent of completion by June 30, 1920.	Estimated date of completion.	Estimated funds required to complete project.
75-mm. field gun and carriage.	6	.....	Not initiated.....	June 30, 1923	\$250,000
75-mm. field gun on caterpillar.	6	.....	do.....	do.....	300,000
105-mm. field howitzer and carriage.	6	.....	do.....	do.....	250,000
105-mm. field howitzer on caterpillar.	6	.....	do.....	do.....	300,000
4.7-inch field gun and carriage.	6	.....	do.....	do.....	360,000
4.7-inch field gun on caterpillar.	6	.....	do.....	do.....	450,000

This estimate includes nothing for study of large quantity production methods. It includes only those items which it is predicted can be inaugurated during the fiscal year 1921, assuming the present rate of progress continues.

COMPLETION OF 14-INCH GUNS.

Mr. SLEMP. The next general item under the continuing appropriation is \$625,000 to complete twenty-two 14-inch guns and \$100,000 for jigs and fixtures?

Col. JENKS. Yes, sir.

Mr. SLEMP. Where are those guns being completed?

Col. JENKS. The guns estimated upon are being completed at Watervliet arsenal.

Mr. SLEMP. Are all the forgings there now?

Col. JENKS. We are condemning forgings from time to time; whether we have complete sets now as a result of condemnation I am not positive.

Mr. SLEMP. You do not know whether or not you are actually working on the finishing of those guns?

Col. JENKS. Yes; we are working on the finishing of all those 22.

Mr. SLEMP. You could not, unless you have the forgings there.

Col. JENKS. Well, we have some forgings; whether the complete sets for the 22 are there, I am not positive, but we have some forgings on all of the 22.

Mr. SLEMP. The total cost of the twenty-two 14-inch guns is how much?

Col. JENKS. \$2,534,000.

Mr. SLEMP. How much are you expending on that particular item this fiscal year?

Col. JENKS. During the fiscal year I do not know. Up to the end of this fiscal year, including the expenditures during the preceding fiscal year, \$1,834,000.

Mr. SLEMP. On those 22?

Col. JENKS. Yes, sir.

Mr. SLEMP. Most of that is this year, isn't it?

Col. JENKS. No, sir; most of that would be before this year, on account of the fact that most of the forgings had been procured before this year.

Mr. SLEMP. Are you sure that all those forgings were paid for before the beginning of this fiscal year?

Col. JENKS. From the amount disbursed at Watervliet Arsenal and remaining to be disbursed I would say that some forgings are being paid for during the present fiscal year.

Mr. SLEMP. And practically all the work then of finishing would be during this fiscal year?

Col. JENKS. Not all; no, sir. There was a very large amount of finishing work done before the fiscal year.

Mr. SLEMP. Not on those 22?

Col. JENKS. Yes, sir.

Mr. SLEMP. In your hearing last year you said then, referring to these 14-inch guns:

Col. JENKS. Those guns are not manufactured and no orders were placed during the war.

Col. JENKS. What page is that?

Mr. SLEMP. Page 194 of the hearings of 1920.

Col. JENKS. There is a typographical error in that; it should read, "Those mounts are not manufactured." I did not note that.

JIGS AND FIXTURES.

Mr. SLEMP. You are asking \$100,000 for jigs and fixtures. How much have you spent on that project this year?

Col. JENKS. At the time these estimates were prepared in January, I estimated then the cost to the department would be \$250,000 during the current fiscal year.

The work consists in getting them from the producers and manufacturers; of handling them; identifying them with the drawings of the jig and fixtures; identifying them with the operating sheet of the manufacturer.

Mr. SLEMP. How many men have you had working on that proposition this year?

Col. JENKS. At Rock Island Arsenal at the present time we have between 120 and 150 men; at Watervliet I would say approximately 20; at Watertown, I do not know. Probably about the same number as at Watervliet and it will require about that number at Frankfort.

Mr. SLEMP. As a matter of fact will not that work be completed by June 30?

Col. JENKS. No, sir. Rock Island Arsenal a month ago informed me that they had on hand about 46 car loads of jigs and fixtures which had not been identified or handled, and about 160 or 180 more car loads to come in that they knew about, and there are others that they did not know about. At the rate they are going they have work there—

Mr. SLEMP (interposing). Is there plenty of space for the depositing of this material?

Col. JENKS. We hope to find it; yes, sir. It is a tremendous task, which one who has not been through the mill himself is absolutely unable to appreciate.

Mr. SLEMP. That applies to all the types of guns that have been manufactured by the Government or through private sources during this war?

Col. JENKS. Not all; no, sir. It applies to those jigs, fixtures, and special tools which were Government-owned. There were many contracts made in which the facilities, tools, etc., did not belong to the Government.

Mr. SLEMP. Have we samples of those facilities, all of them?

Col. JENKS. No, sir.

Mr. SLEMP. Have you made any effort to get that much donation to the Government?

Col. JENKS. Some of the jigs and fixtures which did not belong to the Government have come over to the Government in the settlement of contracts and claims, and there may be cases where we have purchased them, but I do not recall any now.

Mr. SLEMP. In what guns, carriages, and so on will you be shy of jigs and fixtures?

Col. JENKS. All the major items of guns and carriages we have jigs and fixtures for. In the case of the limber and caisson, for example, for the 75-millimeter material, they are practically worn out. In some cases of fire-control equipment we have not jigs and fixtures.

Mr. SLEMP. How many plants outside of the Government arsenals were engaged in the manufacture of guns, gun carriages, mounts, and so on? You can put that in the record.

List of plants engaged in the manufacture of artillery material during the World War.

Name of plant.	Location.	Value Government facilities.	Material produced.
Mount Wilson Solar Observatory.	Pasadena, Calif....	\$75,300.00	Optics.
Bullard Engineering Co.....	Bridgeport, Conn.	4,073,791.02	Finishing of guns.
New Britain Machine Co.....	New Britain, Conn.	586,945.45	3-inch A. A. trailer mounts.
Standard Forge Co.....	Chicago, Ill.....	1,833,852.78	Rough machined cannon forgings.
Standard Steel Car Co.....	Hammond, Ind....	3,734,192.67	240 mm. carriages.
Hess Steel Co.....	Baltimore, Md....	571,288.97	Rough machined gun forgings.
Dodge Bros.....	Detroit, Mich....	8,979,749.19	Recuperators.
Minneapolis Steel & Machine Co.	Minneapolis, Minn.	1,683,442.34	155 mm. gun carriages.
Singer Manufacturing Co.....	Elizabethport, N.J.	5,128,451.39	Recuperators.
Walter Scott Co.....	Plainfield, N. J....	387,616.47	4.7-inch gun carriages.
Symington-Anderson Co.....	Rochester, N. Y....	4,335,964.16	Finishing of guns, rough machining cannon forgings.
New York Air Brake Co.....	Watertown, N. Y....	1,048,710.77	75 mm. gun carriages.
Buckeye Steel & Casting Co.....	Columbus, Ohio....	234,125.16	Black gun forgings.
American Rolling Mills Co.....	Hamilton, Ohio....	184,801.41	155 mm. howitzer carriages.
Mosler Safe Co.....	.....do.....	678,978.72	Do.
Bethlehem Steel Co.....	Bethlehem, Pa....	1,431,285.63	Rough machined forgings.
Neville Island.....	Pittsburgh, Pa....	9,092,116.01	14-inch guns.
Standard Steel Works.....	Burnham, Pa....	1,558,819.86	Rough machined cannon forgings.
Tacony Ordnance Corporation..	Philadelphia, Pa..	3,433,747.12	Do.
Midvale Steel & Ordnance Co....	.....do.....	7,819,921.00	Do.
Heppenstall Forge & Knife Co..	Pittsburgh, Pa....	1,166,529.14	Do.
Edgewater Steel Co.....	.....do.....	2,711,796.14	Do.
Northwestern Ordnance Co.....	Madison, Wis.....	1,420,117.65	Finishing of guns.
Chalkis Manufacturing Co.....	Detroit, Mich....	716,535.18	Do.
Wisconsin Gun Co.....	Milwaukee, Wis....	1,630,483.18	Do.
American Brake Shoe & Foundry Co.	Erie, Pa.....	4,197,520.19	Do.
Willys-Overland Co.....	Toledo, Ohio.....	688,844.16	75 mm. gun carriages.
Studebaker Corporation.....	Detroit, Mich....	393,456.44	4.7-inch gun carriages.
Otis Elevator Co.....	Chicago, Ill.....	1,970,432.00	240 mm. recuperators.
Osgood Bradley Co.....	Worcester, Mass....	1,059,396.27	155 mm. howitzer carriages.
Dayton Steel Foundry Co.....	Dayton, Ohio.....	3,000.00	Steel wheels for 155 mm. artillery.

List of plants engaged in the manufacture of artillery material during the World War—Continued.

Name of plant.	Location.	Value Govern- ment facilities.	Material produced.
Kelsey Wheel Co.....	Detroit, Mich.....	\$42,294.80	Artillery wheels.
School for Precision Optical Operation.	Rochester, N. Y....	12,417.78	Training optical mechanics.
Ford Motor Car Co.....	Detroit, Mich.....	66,098.98	Battery vehicles.
J. G. Brill.....	Philadelphia, Pa..	280,991.63	Reels and carts.
Peerless Printing Press Co.....	Palmyra, N. Y....	15,149.47	Sights.
Mesta Machine Co.....	Pittsburgh, Pa....	1,006,037.04	Recuperator forgings.
Universal Rolling Mill.....	Bridgeville, Pa....	19,947.75	Armor plate for battery vehicles.
National Cash Register Co.....	Dayton, Ohio.....	121,128.72	Azimuth mechanism for B. C. telescope.
Morgan Engineering Co.....	Alliance, Ohio.....	3,505,279.70	12-inch mortar railway carriages.
Alliance Gas & Power Co.....	Alliance, Ohio.....	124,977.67	Furnished power to Morgan Engine Co.
Harrisburg Manufacturing & Boiler Co.	Harrisburg, Pa....	260,321.59	10-inch Schneider railway car- riage parts, 8-inch barbette car- riages.
Marion Steam Shovel Co.....	Marion, Ohio.....	249,999.24	10-inch and 12-inch batignolles railway mounts.
Watertown Arsenal.....	Watertown, Mass.	19,315,638.00	Gun forgings, seacoast gun car- riages, railway mounts, recuper- ators.
Watervliet Arsenal.....	Watervliet, N. Y..	18,500,000.00	Light and heavy artillery guns and howitzers.
Rock Island Arsenal.....	Rock Island, Ill...	42,995,000.00	Gun carriages, limbers, and rais- sons, recuperators, tanks, and tractors.
Total.....		159,346,552.84	

14-INCH RAILWAY MOUNTS—NEW PRODUCTION.

Mr. SLEMP. That brings you up to what is known as new production, and for which the estimate is \$5,151,600, composed of two items; one of twelve 14-inch railway mounts, and the other for motor equipment for field artillery.

Col. JENKS. Yes, sir. There is one item, the first item is \$3,000,-000 for the manufacture of 12 railway mounts for 14-inch guns.

They are intended, now it is understood, for seacoast fortifications, but mounted on such mounts as to be available both for seacoast defense and in the field. It will be a combination mount, and this item might have been better submitted under "DFG," but it was submitted here, as the work during the war was carried on under this appropriation.

Mr. SLEMP. You have thirteen 14-inch naval mounts now?

Col. JENKS. Yes, sir.

Mr. SLEMP. Could you use those in the Field Artillery?

Col. JENKS. In the field, yes; but they are not suitable as seacoast mounts. Five of them were actually used in the field.

Mr. SLEMP. This item ought to be transferred, so far as this item is concerned, to DFG?

Col. JENKS. It might be transferred with greater propriety than to allow it to remain here.

Mr. SLEMP. Where would these 14-inch railway mounts be manufactured?

Col. JENKS. Practically all parts of them at Watertown arsenal.

Mr. SLEMP. You are not doing any work on them now, are you?

Col. JENKS. No, sir.

Mr. SLEMP. Have you ever made any comparative study as to the cost of producing railway mounts outside of the arsenals, as compared with production in the arsenals?

Col. JENKS. No, sir; I have no records of that, because all the railway mounts built during the war in quantity were built outside of the arsenals.

MOTOR EQUIPMENT FOR FIELD ARTILLERY.

Mr. SLEMP. Now, the \$2,151,600 for motor equipment for artillery; that is a field project, is it?

Col. MOODY. Yes, sir. That, in general, is based on providing for the equipment of a single battery of artillery with the latest type of available motor equipment, and in most cases that means the construction of 6 vehicles; the exception to that rule is——

Mr. SLEMP (interposing). That is the motorization of the 75's, isn't it?

Col. MOODY. Yes; the \$2,151,600 is for the complete motorization with the very latest types of motor equipment that might be developed of four regiments of the 75's in different climates and different terrains as recommended by this Westervelt Board.

Mr. SLEMP. How many regiments of the 75's have you now motorized?

Col. MOODY. The War Department has approved the motorization of four regiments, to be regarded as experimental regiments.

Mr. SLEMP. How many have you at the present time?

Col. MOODY. Four at the present time; they are rather indifferently motorized—two of them with 2½-ton tractors which are not very suitable, and two of them with 5-ton tractors, also not very suitable. But my understanding is that the desire of the Chief of the Field Artillery is to reequip these four regiments with better and later types of motorization, and, if that is a success, to extend that motorization to other regiments in general.

TWO AND ONE-HALF TON TRACTORS.

Mr. SLEMP. Now, you are asking for 2½-ton tractors, as I understand?

Col. MOODY. Yes, sir.

Mr. SLEMP. How many?

Col. MOODY. That is estimated per regiment as 105 tractors and 60 trailers per regiment.

Mr. SLEMP. That would make four hundred and some odd tractors?

Col. MOODY. Four hundred and twenty tractors and 240 caterpillar-type trailers.

Mr. SLEMP. And how many guns would that take care of?

Col. MOODY. That would take care of 96.

Mr. SLEMP. Now, is the 2½-ton tractor fully developed?

Col. MOODY. No, sir; it is not. We have one type in service which was hurriedly got out during the war, of which only a few were produced. It was decided to go into quantity production and motorized 50 per cent of the 75s just before the armistice, and the orders, which were all placed, were all cut, and we got eighty some.

Mr. SLEMP. Why would you proceed to manufacture the 2½-ton tractor when your present type is not satisfactory?

Col. MOODY. There is no intention of continuing the old type. We have one type coming through which ought to be running just about to-day in Cleveland, and if that is not perfect—it may be hoping, perhaps, too much to say that it will be perfectly successful, but at any rate it will be near enough so that it will be good enough to duplicate; and we also have one commercial firm building a tractor for us which ought to be done, I should say, about the 30th of June, and one of those types will be good enough to reproduce by September 30, or at the latest by Christmas time next year.

Mr. OGDEN. How many of those 2½-ton tractors have you on hand now?

Col. MOODY. Approximately 100.

Mr. OGDEN. And how many of the 5-ton?

Col. MOODY. Of the 5-ton, about 4,000, and the Chief of Field Artillery or the War Department has no intention to ask Congress year after year to appropriate money for successive regiments, but has agreed that if the 2½-ton tractor is sufficiently developed, and if the tests of those four regiments show that the proposition is entirely practicable and a great saving over horse transportation in money, which it is expected to realize, actually is realized, that he will use up the 5-ton tractors to extend the motorization, realizing that it is not reasonable to expect that good machines on hand can be scrapped.

Mr. OGDEN. Well, in the experiment which you desire to make with four regiments, couldn't you use the 5-ton tractor?

Col. MOODY. Well, the War Department has gone on record as not desiring to do that, because the 5-ton tractor, among other things which it will not do and, in fact, none of the other tractors will, go through the water to the depth that a horse will go through. That is one thing that is regarded as quite vital. You remember that in the Civil War the Potomac River was forded by one Army or the other a number of times; and there is the Rio Grande; and there are many cases where horses can cross water without bridges which will practically stop a tractor; and any new tractor we propose to put out with the Artillery will be capable of passing through water of at least 4½ feet. Of course, if you come to where a horse would have to swim you would have to wait for the building of a bridge, because we do not propose to build submarines, but they would be better than they are at present.

Mr. SLEMP. Do the 2½-ton tractors you have on hand now meet those requirements?

Col. MOODY. No, sir; they do not. They have been approved by the War Department as experimental only. We hoped that in the regiments motorized it would demonstrate what the department might expect in the way of speed, and by nursing them along they have given very good satisfaction.

Mr. SLEMP. Does it not strike you as somewhat illogical to ask for over \$2,000,000 for the manufacture of a type that has not been as yet completely manufactured or tested or approved in any way at all; wouldn't it be better for you to wait until next year and

come back and say, "We have a splendid tractor now that meets all the requirements." Wouldn't that be a better way?

Col. MOODY. That is a balancing off, rather, of judgment. For each regiment of 75's that is motorized it would save approximately \$13,000 a month.

Mr. SLEMP. As Mr. Ogden says you can do that with the 5-ton tractors and save that?

Col. MOODY. The War Department, which is higher authority than I am, has gone on record as refusing to motorize with the 5-tons on hand unless they have been tested in units as large as a regiment. It undoubtedly is the most radical move made by any Army in recent years.

Mr. OGDEN. Do you know the attitude of Gen. Snow; I believe he is chief of the Field Artillery?

Col. MOODY. Yes; I have a written statement from Gen. Snow which I obtained before putting in the estimate, and Gen. Snow's policy was that he desired four regiments motorized with the best type of material available, and if those regiments proved thoroughly satisfactory to the Field Artillery—if the Field Artillery was satisfied with them, they would extend that, but with the obsolescent types on hand.

Mr. OGDEN. He wished the experiment to be made with the 5-ton tractors on hand, did he not?

Col. MOODY. No, sir; I think I can turn to that and give you his exact words on the subject. Perhaps this will be shorter; this is my reply to Gen. Snow on summing up my understanding.

Mr. OGDEN. Well, would you read Gen. Snow's letter; I think it is dated November 4, 1919?

Col. MOODY. It reads in substance as follows:

In response to a verbal request of Lieut. Col. Webster A. Capron on this day, you are advised that the policy of the Chief of Field Artillery in connection with the motorization of regiments of light artillery and of the utilization of existing motor equipment for this motorization is indicated below:

1. The Chief of Field Artillery desires that the light artillery of the National Guard be organized in accordance with the prescribed organization for the light artillery of the Regular Army. All light artillery regiments of the National Guard should be horsed as no light regiments of the regular service have been motorized, except for experimental purposes. It is not the policy of the Chief of Field Artillery to concur in the equipment of any National Guard troops along experimental lines.

2. In connection with the R. O. T. C. units at educational institutions, it is the policy of the Chief of Field Artillery to motorize those Field Artillery units at institutions which specialize in mechanical and engineering training. To other units only a sufficient amount of motor equipment is issued to permit the necessary instruction of students in the operation and care of motor equipment. A list of institutions in which Field Artillery units of the R. O. T. C. have been installed is sent herewith, showing the amount of motor equipment actually issued or recommended to be issued at each institution.

3. In accordance with the recommendations of the Westervelt Board, it is earnestly desired by the Chief of Field Artillery that the Ordnance Department experiment with and develop a light tractor (such as the 2½-ton tractor) to be issued to light regiments for motorization experiments. It is believed that no efforts should be spared to develop a tractor of the desired type. If the experiments in the motorization of light regiments prove successful and a light tractor (such as the 2½-ton tractor) is recommended for this purpose, everything practicable should be done to prepare to put this tractor in quantity production without delay, but it shall not be the policy of this office to issue this

tractor to the service until the 5-ton tractors on hand have been issued and the supply of the same available for light artillery regiments exhausted.

4. It is to be understood that this is merely an indication of the policy which the undersigned desires to see put into effect and which will govern the office of the Chief of Field Artillery as long as he is the incumbent.

WM. J. SNOW,
Major General, United States Army,
Chief of Field Artillery.

Mr. OGDEN. Now, as I understand, Colonel, you have on hand a sufficient number of 5-ton trucks to carry out this experiment?

Col. MOODY. Well, to make that clear, that this is a reply to a memorandum which we wrote, of which I have not a copy, and a subsequent first indorsement on this copy; and Gen. Snow's second indorsement will clear up his attitude. That is the point I am trying to make, that this alone will not show—

Mr. OGDEN (interposing). Is there any contradiction in the two letters—the one you have just read and the one you are now referring to?

Col. MOODY. I should say there is some, because this memorandum which I have just read, until we get along a little further, does not cover specifically the types. That is, this memorandum was not thought to be definite to us. Perhaps the same question occurred to you as occurred to me.

If I can read that or insert it in the record. The purport of it was—I can probably just read one sentence. In reply to that memorandum, however, I called Gen. Snow's office on the telephone and asked them what they meant, and they told me what they did mean was the equipment of the four regiments with the latest equipment we could get, and later I put that in writing and forwarded it to his office, as follows:

2. It is further understood that it will be satisfactory from the viewpoint of the Chief of Field Artillery for this department to include in its estimates for the fiscal year commencing July 1, 1920, and ending June 30, 1921, sufficient funds to provide for the reequipment of these four regiments with the best form of motor traction that may be developed up to that time.

3. It is further understood that should emergency require the motorization of more than four regiments of light artillery before decision as to the ultimate type of motorization is reached, that the 5-ton artillery tractor, of which there is at present a sufficient supply on hand, will be a satisfactory tractor for emergency motorization.

That is under date of November 6, and then under date of November 7 they returned that to us with the notation:

The understanding outlined in the preceding indorsement is correct.

(Signed) WILLIAM J. SNOW.

Mr. SLEMP. These 75's were horse guns during the war?

Col. MOODY. Yes; but in September, 1918, a board was convened at general headquarters of the American Expeditionary Forces and recommendation was made for the motorization of 50 per cent of the 75's, and in Germany that motorization was partially carried out and put into effect with the army of occupation.

Mr. SLEMP. Is that motorization still there?

Mr. MOODY. I presume some of them are still there, although a majority have been returned to the United States.

PURCHASE, MANUFACTURE, AND TEST OF SEACOAST CANNON FOR COAST
DEFENSE (UNITED STATES).

Mr. SLEMP. Now, the DFG, Colonel, you are asking for \$14,365,400. That has been reduced, I believe.

Col. JENKS. That estimate was reduced to \$5,498,438.

Mr. SLEMP. And contract authorizations?

Col. JENKS. That makes a total of \$6,121,400. That amount may be further reduced by \$900,000, as there is a larger balance under the present appropriation than what I was aware of at the time the estimate was submitted, due to errors in the records in the office of the Director of Finance; the available balance can be used during the present fiscal year for material which was purchased under contract authorization or is still to be purchased, and which was to have been covered under the original estimates by cash to be appropriated.

Mr. SLEMP. What is the state of your balance at the present time?

Col. JENKS. On March 19, 1919, the Treasury balance was \$6,233,446.14; and the unallotted balance was \$1,264,260.06.

Mr. SLEMP. What are the outstanding allotments?

Col. JENKS. The difference between the two is covered by allotments.

Mr. SLEMP. You do not have a large amount of money at your disposal now?

Col. JENKS. No, sir. There may be, as near as I can calculate, there may be about \$429,000 to be returned.

Mr. SLEMP. That is, exclusive of the \$900,000 to which you referred a moment ago?

Col. JENKS. Yes, sir; I am not certain of the accuracy of those figures, because I have been under the impression up to the last few days that all the money in the hands of the disbursing officers would be required.

The CHAIRMAN. You mean by that, Colonel, that you are going to use all of the appropriation during the present fiscal year?

Col. JENKS. Yes; with the possible exception of \$429,000, which the records now available indicate may not be required.

The CHAIRMAN. That would be over and above the \$900,000 which you estimate that you will use for the purchase of material between now and the 30th of June?

Col. JENKS. Yes, sir.

Mr. SLEMP. Will you state what you have done this year with the money you had on hand and follow that with a statement of what you expect to do with the money next year?

Col. JENKS. The funds under this appropriation have been used this year for the following principal items:

The completion of one 16-inch gun and disappearing carriage, under the board of review project; the completion of the manufacture of 12-inch barbette carriages for existing 12-inch guns for board of review project; work on twelve 16-inch guns and barbette carriages for board of review projects; and work on twelve 16-inch howitzers and barbette carriages for board of review projects; also the completion of 3-inch antiaircraft material for board of review projects.

Details of estimate.

Continuing experimental work, fire-control material.....	\$95, 100
New production, manufacture of three 16-inch guns, cash.....	343, 200
Contract authorization	183, 600
Total	526, 800
New experimental work:	
One 18-inch gun and carriage.....	300, 000
Two proof carriages for 12, 14, and 16 inch guns.....	175, 000
Study of 16-inch railway mount.....	40, 000
Experiments on steel and ballistics.....	28, 400
Total	543, 400
Continuing manufacture:	
Twelve 16-inch guns.....	1, 023, 000
Twelve 16-inch gun carriages.....	1, 453, 000
Twelve 16-inch howitzers.....	609, 000
Twelve 16-inch howitzer carriages.....	1, 850, 000
Fire-control material	21, 100
Total	4, 956, 000
Deduct amount available from existing appropriations.....	900, 000
Total	4, 056, 000
Total cash	5, 037, 800
Total contract authorization.....	183, 600
Aggregate	5, 221, 400

DETAILS OF ESTIMATES.

The estimates for the coming year include the following items—in these items I have deducted the \$900,000 before mentioned—\$4,056,100 for material manufacture now in process; \$95,100 for continuing experimental work; \$343,200 in cash, and \$183,600 in contract authorization for new manufacturing program, and—

Mr. SLEMP (interposing). Manufacturing program means three 16-inch guns?

Col. JENKS. Yes, sir; \$543,400 for experimental work which is not in process.

Mr. SLEMP. Well, what does that mean?

Col. JENKS. The experimental work consists of the following items: \$17,000 for procurement of apparatus and study of interior ballistics, and for the procurement of ordnance data; \$11,400 for the purchase and manufacture of experimental steel; \$300,000 for the inauguration of development of an 18-inch gun and mount; \$185,000 for two adjustable proof mounts for 12-inch, 14-inch, and 16-inch guns for use of the Aberdeen proving grounds; \$40,000 for preliminary work on the study and preparation of drawings for a railway mount for 16-inch guns.

Mr. SLEMP. Now, referring to the continuing of the manufacturing program; have all the 16-inch gun forgings been delivered?

Col. JENKS. No, sir; the forgings for the last five guns are not due until the next fiscal year.

Mr. SLEMP. Are the twelve 16s already contracted for?

Col. JENKS. The contracts have been placed for all forgings for all guns under the program for continuing manufacture. The delivery of the 16-inch gun forgings on the last orders requires 15 months for delivery.

Mr. SLEMP. These guns are to be used in the seacoast defense?

Col. JENKS. Yes, sir.

Mr. SLEMP. Have you put 14-inch guns on railway mounts?

Col. JENKS. We have one 14-inch gun—I think it is a 40-caliber gun—on an experimental railway mount that was built before the war, and then we have some 14-inch guns on naval railway mounts.

Mr. SLEMP. Mr. Good asked you this question last year:

How many 14-inch guns have you already mounted on railway carriages?

And your answer was—

We have six, and there is a seventh, which is constructed for experimental purposes.

Now, are all the 14-inch guns on railway mounts simply naval mounts, outside of the one you have constructed?

Col. JENKS. Yes, sir.

Mr. SLEMP. The delay in the manufacture of these 16-inch guns and their carriages and the howitzers and their carriages would reduce the amount of the appropriation somewhat?

Gen. COE. We would spread it over a long time, Mr. Chairman, and the amount of money will be less.

Mr. SLEMP. Will this amount be sufficient to complete the work for the coming year?

Gen. COE. No, sir.

Mr. SLEMP. You had better put in the cost of the 16-inch howitzers and carriages.

Col. JENKS. The present estimated cost of the 16-inch guns is \$300,000, and the barbette carriages \$250,000. Now, the present estimated cost of the 16-inch howitzers is \$150,000 and of the howitzer carriages \$200,000. I wish to state here also that according to the present estimates slightly over a million dollars will be required to complete this work after the coming fiscal year.

Mr. SLEMP. This new production of 16-inch guns will be spare guns?

Col. JENKS. One of those 16-inch guns is for proving-ground use, and the other two are spare guns. At the present time we have no 16-inch guns or howitzers, either one, for proving-ground use; and we would, of necessity, retain back from the sea-coast defenses one of each of these types of matériel for proof work, unless we provide a spare gun and a suitable mount. The mount that we have estimated on for proving-ground use is simple in comparison with that required for service use and costs very materially less.

These spare guns included here would probably not be completed before 1924 or 1925. These estimates cover the procurement of matériel only. It is not contemplated to do any of the work.

GUN FORGINGS.

Mr. SLEMP. You do not make any of the forgings for any of these 16-inch guns in the Government arsenals?

Col. JENKS. No, sir; we have no capacity for 14 or 16 inch forgings.

Mr. SLEMP. Do you have capacity for the forgings for the carriages and some of that work?

Col. JENKS. We have capacity for forgings and castings for the carriages, but the amount of work at Watertown Arsenal is so small that it is impossible to do the casting work there, and we have been obliged to put our orders for large castings outside.

Mr. SLEMP. Have you let the contracts for all the 12-inch and 16-inch gun carriages, for such material as you need?

Col. JENKS. We have not yet placed the order for all material for the gun and howitzer carriages. We have placed orders for all gun forgings. We expect to place orders before June 30 for as much of the material for the carriages as the funds are available to be used.

EXPERIMENTAL WORK.

Mr. SLEMP. Now, as to this experimental work, you start out with a design for an 18-inch gun and carriage. What is the cost of that gun and carriage?

Col. JENKS. As near as I can estimate at the present time, it would cost \$1,080,000.

Col. JENKS. Yes; for gun and mount.

Mr. SLEMP. Where would you make them?

Col. JENKS. The forgings could be made at the Bethlehem Steel Works, and, I think, at the Midvale Co.'s works. The only place existing to-day where the guns could be machined is the navy yard in Washington. The carriage itself could be built at Watertown Arsenal, but the manufacture of the carriage would probably require larger facilities at Watertown than exist now and which do not exist anywhere in the country.

16-INCH RAILWAY MOUNTS.

Mr. SLEMP. Now, your 16-inch railway mount, you wish to start on that?

Col. JENKS. I merely want to start and make a study of it to see whether it is practicable to construct a railway mount for a 16-inch gun. Concerning this 18-inch gun, I would like to add that an 18-inch gun and carriage would probably be completed and proof fired somewhere between 7 and 10 years after the work is inaugurated.

Mr. SLEMP. So that if we were in any immediate danger we could not get any protection in that way?

Col. JENKS. It is not that, sir. If the country requires a gun heavier than the 16-inch gun for future defense, it is necessary for the Ordnance Department to produce it, and the Ordnance Department can not economically produce a new type of larger calibers of matériel without having first studied its manufacture by building experimental and pilot matériel.

Mr. BYRNS. How long does it take to complete a 16-inch gun?

Col. JENKS. At the present time it would take us approximately three years to complete a 16-inch gun after the order is placed.

Mr. BYRNS. And from seven to eight years for the 18-inch gun?

Col. JENKS. That is new matériel and a larger size which would require a slight extension of the existing capacity and require the greatest care and engineering skill in the handling of it. It is a new problem which involves greater weights and greater masses of matériel than have ever been used in single forgings.

Col. RICE. It would not be possible to complete a 16-inch gun in a new and untried design, in three years.

The CHAIRMAN. Colonel, you test all your 16-inch guns at the proving ground just as you do the other guns?

Col. JENKS. Yes, sir; all new models.

The CHAIRMAN. If that is the case, why is it necessary to have a 16-inch gun at the proving ground unless you wish to fire it to destruction?

Col. JENKS. We have to test the fuses and powder.

The CHAIRMAN. You have new guns coming on occasionally and I should think you could collect the items you wanted to test with regard to a 16-inch guns when you receive it, test it, and then send it to its place.

Col. JENKS. If we did that, the additional cost of handling this 16-inch gun and carriage would soon amount to more than the cost of the gun and carriage permanently emplaced.

The CHAIRMAN. Why?

Col. JENKS. The cost of erecting——

The CHAIRMAN (interposing). You would mount it at the proving ground and fire it?

Col. JENKS. Well, there would be the cost of setting it up and tearing down the carriage again.

The CHAIRMAN. Well, you have to mount it to test it, do you not?

Col. JENKS. We do not mount all carriages at the proving ground. We only mount one carriage at the proving ground to test the type matériel. The others are ordinarily mounted at the fortification. Such carriages are not tested at the proving grounds. Ordinarily we test in the proving grounds the first pilot gun carriage, and the subsequent ones are not tested at the proving ground, but at the fortification.

Col. RUGGLES. That comes under my organization. Generally the appropriations are not sufficient to enable us to make the projectiles and the powder at the same time with the other material. Congress does not appropriate money in such a way that we can deliver everything at once. Of course, our contracts do not come out in the same way. If we did not have any spare guns for proving-ground purposes, it would mean that we would have to keep a gun back from the fortifications. Now, take our guns that have been installed for many years, the projectiles are not yet complete. Therefore we have to have a gun at the proving ground to test the projectiles and the powder. Now, if something goes wrong with the powder and it gives an excess pressure and the velocity drops off, then we have to examine that powder to determine what is the matter, and we have to test it at the proving ground to discover the cause of the irregularity, and that test requires a carriage and a gun.

The CHAIRMAN. Not necessarily a 16-inch gun?

Col. RUGGLES. Oh, yes; because we must test the 16-inch projectile.

The CHAIRMAN. Yes; but the powder is the same that you use in the 14-inch gun?

Col. RUGGLES. Oh, no.

The CHAIRMAN. You use a different grain of powder?

Col. RUGGLES. Oh, yes.

The CHAIRMAN. And a different fuse?

Col. RUGGLES. Not necessarily a different fuse, but it is a different powder and a different projectile. Of course, we get armor-piercing projectiles from time to time, and we test them, and we can only test them at the proving ground. We must have a 16-inch gun for a 16-inch projectile. The same thing is true of the powder—that is, the powder that goes into a 14-inch gun will not work in a 16-inch gun. It is the same kind of composition, but it is a different shape and grain. It is absolutely necessary to have a duplicate gun at the proving ground. Now, they spoke of one gun and of spare guns. Of course, we do more firing with the one gun at the proving ground than they do in the forts. We test our fuses and powder and we should test our fuse in the caliber in which the fuse is to be used. We fire everything that is to be used in the seacoast forts. As a result of that we fire that gun more than the gun in the fort is fired, and that gun will be worn out, and we ought to have a spare gun to take the place of it when it is sent back to be relined.

The CHAIRMAN. Now, Colonel, with regard to the forgings, I understand that out of the appropriation you are asking for this year you say you do not expect to spend anything for spare guns——

Col. JENKS (interposing). On these three spare guns; yes.

The CHAIRMAN. Then why is it necessary to purchase the material this year when it is admitted everything is excessively high?

Col. JENKS. We will not be able to do any work the next fiscal year, that is, the fiscal year 1922, unless we purchase the material this year.

The CHAIRMAN. When will it be delivered?

Col. JENKS. The last contract for 16-inch gun forgings requires 15 months for delivery.

The CHAIRMAN. Did you state how much it would cost for those three guns?

Col. JENKS. The total estimated cost of the guns is \$300,000 apiece.

The CHAIRMAN. How much of that would be for material?

Col. JENKS. About half of it.

The CHAIRMAN. \$150,000 for material?

Col. JENKS. Yes, sir; each.

The CHAIRMAN. Then all you actually need is an authorization for the purchase of material during the fiscal year. If it can not be delivered until 15 months after it is contracted for, you will not be able to get any material next year?

Col. JENKS. The estimates included some cash, but we really could accomplish the result by a contract authorization of the amount asked for in cash and contract authorization.

Mr. SLEMP. You do not mean the whole amount?

Col. JENKS. Only about \$526,800. There are some forgings, like the forgings of the breechblock that could be delivered within a few months after the placing of the order. The estimate was made up on the basis of paying for such forgings as we would be able to get during the next fiscal year.

14-INCH RAILWAY MOUNTS.

Mr. SLEMP. Now, you said that you thought the 14-inch railway mount carriages ought to be considered under this item, "DFG." You are asking for twelve 14-inch railway mounts.

Col. JENKS. Yes, sir.

Mr. SLEMP. You already have one?

Col. JENKS. We have one of an old model for a shorter gun, and the 12 we are asking for are 12 carriages for a more powerful 14-inch gun, and the carriages themselves differ in details from the 14 carriages we have on hand.

Mr. SLEMP. Now, if you had them, what would you do with them?

Gen. COE. I would put that in the hands of the troops. We have a railway artillery brigade of four regiments at Camp Eustis, Va., which is organized to handle guns from 8-inch caliber up to a 12-inch mortar. I would place all of these 12 in the hands of troops for use at any point on the coast line where they might be suitable and needed.

Mr. SLEMP. Have you not a definite program for use somewhat similar to what you have outlined for the 16-inch guns?

Gen. COE. No, sir; because the 16-inch guns are on a fixed carriage. We can utilize the 14-inch rifles on railway mounts in definite localities. We might have a half dozen localities where we could utilize one of those guns, depending on the situation.

Mr. SLEMP. What I am trying to get at is, have you worked that problem out?

Gen. COE. We have worked the problem out in general terms. We are now asking the department commanders to work it out in detail, including the emplacement of concrete blocks and the necessary park locations for handling each of the calibers.

Mr. SLEMP. You have not had any reports from these department commanders particularly?

Gen. COE. Yes, sir; we have had a report from the department commander of the Northeastern Department. We have not had reports from the other department commanders.

Mr. SLEMP. What does the Northeastern Department commander think he could utilize in his department?

Gen. COE. He submitted a complete project in quite a large volume and we returned it to him for further consideration, because we did not think he thoroughly appreciated in the study of the question the possible value of railroad artillery of various calibers.

Mr. SLEMP. As a general proposition, I suppose, you place them along the coast?

Gen. COE. At the more important points; for instance, Montauk Point, on Long Island; on Cape Cod; Cape Henry, Va.; and localities of that nature.

Mr. SLEMP. Will you have any place for them in the Southeastern Department or the Western Department?

Gen. COE. In the Western Department, but probably not in the Southeastern Department. There are no vital naval bases to protect or no locality of such importance as to require the use of the 14-inch gun in the Southeastern Department; at least, we do not anticipate such use. It might be that the development of a war would bring

about the use of those guns in the Southeastern Department, but the developments of war can not always be foreseen.

Mr. SLEMP. In your Western Department you would place them where?

Gen. COE. At San Francisco particularly.

Mr. SLEMP. Would you give any protection to Puget Sound through that means?

Gen. COE. It would depend entirely on the development of the war as to whether they would be sent to Puget Sound. While the armament there is nothing more than 12-inch at the present time, the ranges are comparatively short and the importance of the locality is probably not such as to require guns of this kind.

Mr. SLEMP. As a general proposition, under whose authority is this railway artillery—the Coast Artillery?

Gen. COE. Yes, sir. We have recommended that a certain amount of it should go to Honolulu. We have made such allocations as we could of the greater part of what is remaining; that is, its allocation which would come into operation at the beginning of an emergency or just prior to a war, when political conditions were threatening, so that the department commanders would know just what to expect to have available. We expect, however, to retain for purposes of training and instruction a larger portion of the mass at Camp Eustis training center for the present. In case of maneuvers or any problem which the department commanders may get up, where the use of railway artillery is suitable, it could be sent there, and it will be sent there if funds are available for that work.

The CHAIRMAN. So that you would make your forgings at the Charleston plant for the 16-inch guns?

Col. JENKS. Yes, sir. That plant, I understand, will be equipped for the manufacture of forgings up to a 16-inch gun.

Col. RUGGLES. It is a naval plant.

Col. JENKS. It is a forging plant only, and not a finishing plant.

Mr. SLEMP. None of the forgings for the 16-inch guns have been gotten up to date from down there?

Col. JENKS. No, sir.

Mr. SLEMP. When will that be ready for work?

Col. JENKS. I do not know, sir.

Mr. SLEMP. Would you let the forgings for these three guns down there?

Col. JENKS. We would give the Navy Department a chance to submit a bid on them.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION FOR MOUNTAIN, FIELD, AND SIEGE CANNON.

Mr. SLEMP. The next item is for—

Purchase, manufacture, and test of ammunition for mountain, field, and siege cannon including the necessary experiments in connection therewith, the machinery necessary for its manufacture, and the necessary storage facilities. \$1,756,000.

You have had quite a lot of money for that purpose in times past, and some of it was repealed last year. Give us the state of your balances?

Col. PELOT. The Treasury balance under C, as of March 5, 1920, was \$654,762,909.68; under C, act of June 16, 1917, the Treasury balance on the same date was \$39,549,782.62. Of the Treasury balance under C, \$177,068,113.16 represents an unallotted balance. The remainder is the amount due on contracts and orders. Of the Treasury balance under C, act of June 15, 1917, there was an unallotted balance of \$10,011,510.80, the remainder representing the amount due on contracts and orders in each case.

Mr. SLEMP. Are those actually determined to be due, or is that simply included in the reservation of \$654,000,000? In other words, is that simply the amount of money that has been allotted?

Col. PELOT. It represents the difference between the unallotted balance and the Treasury balance. I can not say that it represents the true amount. It has not been checked up to show that it is the true amount; it includes reservations. Of the amount due on contracts and orders, there is a certain amount that will be returned to the Treasury. Of the total amount of money that we have on hand under C and the C act, we expect to be able to return to the Treasury about \$540,000,000.

Mr. SLEMP. Does that practically wipe out the claims, or will there be some unadjudicated claims?

Col. PELOT. The majority of the claims can be settled by June 30. There may be a few of them that will not be settled.

Mr. SLEMP. There might be a little more money to return if you made favorable settlements?

Col. PELOT. Yes, sir; it may be a little bit one way or the other. It may require a little more or a little less than what we now expect. It is hard to estimate it.

Col. RICE. According to the general history of the claims, it has required less.

Mr. SLEMP. This includes authorizations as well as appropriations. You did not have much in the way of authorizations.

Col. RICE. There was only a small amount of authorization under D. F, G, fortifications bill, as I remember.

Mr. SLEMP. There is very little authorization left under C?

Col. RICE. I would have to look that up.

Mr. SLEMP. This is practically repealing the appropriation?

Col. RICE. Yes, sir.

Mr. SLEMP. Have you been manufacturing much material this year, or producing shells and ammunition under this item, and if so, how much?

Col. PELOT. Under C we have had several activities in the past year. The first is the care and preservation of matériel that has been manufactured and returned from France, or which was on hand in this country, and is being prepared as a war reserve. Another activity was the experimental work.

Mr. SLEMP. How much did you expend on those preservation-of-matériel activities?

Col. PELOT. I can not give you the amount now that has been spent on preservation. There has been set aside a total of \$13,000,000 for that purpose.

Col. RICE. Any of that fund that has not been spent by this time will have to be expended during the remainder of the fiscal year, in all probability, unless you want to lose the ammunition.

Mr. SLEMP. Does that take care of the ammunition produced and sent abroad and that was otherwise secured in this country? Is all of that ammunition boxed up and stored?

Col. PELOT. The work on that is now under way, but it is not yet completed by any means.

Mr. SLEMP. Will it be completed by the 1st of July of this year?

Col. PELOT. I am of the opinion that it will not be. That work is not under my jurisdiction.

Mr. SLEMP. You are not making any estimate for work of that kind for the next fiscal year?

Col. PELOT. If any estimate is being made, it is being made under some appropriation other than C.

Mr. SLEMP. You spent money under this appropriation for that purpose this year, did you not?

Col. PELOT. Yes, sir; an estimate was made last year for that specific purpose under C.

Mr. RAPPOLD. I understand that the preservation of the ammunition is provided for under ordnance stores and supplies this year. That is not in this estimate.

Mr. SLEMP. All of the ammunition is back from France?

Col. PELOT. Yes, sir; all of the ammunition is back from France.

Mr. SLEMP. Are you having ammunition delivered to you this year under old contracts?

Col. PELOT. No, sir.

Mr. SLEMP. You have stopped that?

Col. PELOT. We have some contracts which are experimental. They are not production contracts. The production work was stopped.

Mr. SLEMP. You are not spending any money for the production of ammunition this fiscal year?

Col. PELOT. No, sir.

Mr. SLEMP. How much money have you spent this year as a whole?

Col. PELOT. Our total disbursements from July 1, 1919, to December 31, 1919, under C, were \$93,561,064.80, and under C, act of June 16, 1917, \$21,800,883.03.

Mr. SLEMP. Can you subdivide that?

Col. PELOT. The disbursements on account of claims, to the same date, under C, were \$42,433,765.23, and under C, act of June 15, 1917, \$576,529.99. The difference represents the disbursements for purposes other than claims.

Mr. SLEMP. The difference is how much?

Col. PELOT. The difference under C is \$51,127,301.57, and under C act of June 16, 1917, \$21,224,353.04.

Mr. SLEMP. Then you spent \$74,000,000 for which you got something, either in the production of material or something else. What was it expended for?

Col. PELOT. The disbursements for current orders during that period is represented by only \$746,023.43. I can give you an example of some of those current orders.

Mr. SLEMP. What were they for—different types of shells?

Col. PELOT. Fuses, shell-closing plugs, tin containers for preservation of ammunition, etc.

Mr. SLEMP. Now, give us a statement showing what you did with that seventy and odd million dollars.

Col. PELOT. The disbursements other than on current orders and claims amounted to \$71,605,681.18. I can not give you the details of the manner in which those funds were expended, except to make the general statement that it includes all of the expenditures by the Field Service in the preservation of ammunition, by the Salvage Board in salvaging equipment, raw materials, ammunition components, etc., and by the Construction Division in completing certain projects as, for instance, the by-product coke-oven projects.

Mr. SLEMP. Where is that?

Col. PELOT. They were in several localities.

Mr. SLEMP. Were they completed?

Col. PELOT. They are in course of completion now.

Mr. SLEMP. How much did you expend on the coke oven proposition?

Gen. RICE. That is for completion under contracts made at the time.

Mr. SLEMP. You had to complete them?

Col. RICE. Eventually they will become the property of the owner, and the United States will have to be reimbursed.

Mr. SLEMP. I would like to get a complete statement of that in the record.

STATEMENT ON COKE-OVEN CONTRACTS.

In the fall of 1917, and carrying over into the spring of 1918, the Ordnance Department made certain contracts with commercial companies for the construction of coke ovens and gas plants, to insure the production of certain amounts of toluol to be used in the manufacture of high explosives.

Five such contracts were entered into for the construction and operation of by-product coke-oven and carbonization plants. These contracts were as follows:

First. Contract dated July 17, 1918, with the Birmingham Coke & By-Products Co., Birmingham, Ala., to design, acquire, install, construct, equip, and operate a 50-oven standard by-product coke plant, with the necessary equipment and apparatus to constitute a complete up-to-date by-product and coke-oven plant, the said plant to have the capacity of approximately 950 tons of coal per day, and a production of approximately 400 gallons of toluol and 11½ tons of ammonium sulphate per 24 hours.

This was an informal contract. It further provided that in no event should the contract expire before six months operation had been completed, and upon the expiration of this term the United States may at its option have the plant appraised, and in that case the contractor agrees to purchase the plant at the price agreed upon by three appraisers, one to be appointed by the company, one to be appointed by the United States, and these two to select the third appraiser.

The contract further provides that should the United States desire not to appraise the plant, and if, two years after the expiration of the contract, the United States should desire to dispose of the plant, it will give the contractor first option of purchase at an appraised value. In case the contractor does not desire to make the purpose the United States has the right to dispose of the plant as may be authorized by law.

The original contract being informal, a validating contract was entered into on June 7, 1919, between the Birmingham Coke & By-Products Co. and the United States of America, validating the original contract with certain modifications, namely: That whereas under the informal contract the United States had agreed to bear the cost of operation of the plant and that the demand by the United States for the products and by-products of the plant had ceased, owing to a cessation of the hostilities, the cost of operation in the future would be borne by the Birmingham Coke & By-Products Co.

After the armistice, consideration was given to either canceling the entire contract or to allow the contract to be completed and the plant, after its completion, to be appraised and purchased by the contractor. As a result, a supplemental contract to continue the construction of the plant to completion, under the second alternative, was entered into by the Ordnance Department.

On October 6, 1919, the Chief of Ordnance officially transferred the duties of contracting officer, together with all records and such personnel as was desired, to the office of the Chief of Construction Division, for completion of the contract.

Second. Contract dated July 10, 1918, with Domestic Coke Corporation, Cleveland, Ohio, to design, acquire, install, construct, equip, and operate a 60-oven by-product coke plant at Cleveland, Ohio, together with the necessary equipment and apparatus to constitute a complete up-to-date by-products coke-oven plant, the said plant to have a daily capacity of 1,100 tons of coal and a daily production of approximately 550 gallons of toluol and 13½ tons of ammonium sulphate.

Inasmuch as the armistice was signed shortly after the construction work on the plant called for by this contract was started all work was suspended and the contract settled by the claims board.

Third. Contract dated September 9, 1918, with the Domestic Coke Corporation, Cleveland, Ohio, to design, acquire, install, construct, equip, and operate a 60-oven by-product coke plant at Fairmont, W. Va., together with the necessary equipment and apparatus, to constitute a complete up-to-date coke-oven plant, the said plant to have a daily capacity of approximately 1,100 tons of coal, and a daily production of approximately 450 gallons of toluol and 13½ tons of ammonium sulphate.

The terms of this contract were similar to the contract entered into with the Donner Union Coke Corporation, referred to below, with the exception that no subcontracts were entered into for the sale of the products and by-products, but the material to be sold would be sold upon prices fixed by the United States from time to time.

This contract should run from date thereof until three years from and after the completion of the plant herein provided is ready for operation, unless sooner terminated as hereof provided. At any time prior to the termination of the contract, but more than one year subsequent to the issuing of a proclamation by the President of the United States, declaring peace, the United States shall have the right upon 90 days' notice in writing to the contractor, to declare this contract terminated and to have said plant appraised, and the contractor agrees to take and purchase said plant at the value fixed by the appraisers. The appointment of the appraisers in this case would be similar to that outlined in the contract with the Birmingham Coke & By-Product Co.

After the armistice it was decided by the Chief of Ordnance to proceed with the construction of the plant and fulfill the obligations as outlined in the original contract. The supervision of the construction and the transfer of the supervision to the Construction Division was similar to that outlined above for the Birmingham Coke & By-Product Co. in every respect.

Fourth. Contract dated May 29, 1918 with the Donner Union Coke Corporation, the Donner Union Steel Co., and the Buffalo Union Furnace Co., Buffalo, N. Y., to design, acquire, install, construct, equip, and operate a 150-oven by-product coke plant at Buffalo, N. Y., together with the necessary equipment and apparatus to constitute a complete by-product coke plant, the said plant to have a daily capacity of approximately 2,850 tons of coal and a production of approximately 1,200 gallons of toluol and 33½ tons of ammonium sulphate.

This contract provided that the cost of construction and operation would be borne by the United States, and further provided that the coke company would receive a commission of 5 per cent for marketing all products of the plant and an additional 2½ per cent for guaranteeing the accounts, the United States to benefit by all proceeds derived from operation and to stand the expense of any loss due to operation.

The time of operation was to extend for a period of the present war and for a further period of six months thereafter, unless sooner terminated as hereinafter provided for, but in no event should this contract be terminated prior to the completion of said plant.

The United States retained the right to purchase such products and by-products of said plant as are desired, with the exception that the coke corporation agrees to sell and the Donner Steel Co. agrees to purchase all salable surplus gas after the removal of the residuals therefrom at a contract price of 10 cents per thousand cubic feet, and also the coke corporation agrees to sell and the Donner Steel Co. agrees to purchase all tar produced at said plant at the prevailing market price. Also the coke corporation agrees to sell and the steel company agrees to purchase 70 per cent of all by-product coke produced at the market price. Also, the coke corporation agrees to sell and the

Buffalo Furnace Co. agrees to purchase the balance of the coke produced at said plant at the prevailing market price. All other products and by-products of said plant shall become the property of the United States should the United States so desire. Otherwise, these products and by-products will be sold by the coke corporation at such price or prices as the United States shall from time to time fix.

After the armistice it was determined by the Chief of Ordnance to proceed with the work on this contract as provided therein, the actual supervision of the construction of the plant and its transfer to the Construction Division was similar in every respect to the procedure outlined for the Birmingham Coke & By-Product Co.

Fifth. Contract dated May 20, 1918, with the International Coal Products Corporation, New York City, to construct and operate a carbo-coal distillation plant at Clinchfield, Va., said plant to have a capacity for distilling 150,000 tons of raw coal per annum and an estimated annual production of 112,500 gallons of toluol and 750,000 pounds of ammonia, together with other by-products.

This contract differed in nearly every respect from the other contracts outlined above. It amounted practically to nothing more than advancing the International Coal Products Corporation the necessary funds to construct the plant, the United States receiving, dollar for dollar, the amount advanced after the completion of the plant, at the same time realizing 5 per cent interest on its investment. The cost of construction and operation up to \$2,000,000 is to be borne by the United States with the understanding that beginning at the date of completion the International Coal Products Co. would reimburse the United States in five annual payments the total amount of money advanced by the United States for the construction of this plant, plus 5 per cent on the outstanding account. The Blair Co., of New York, has guaranteed the account of the International Coal Products Corporation.

Thus four of the five contracts for by-product coke ovens are being carried on to completion. These contracts and the total net authorization are as follows:

Firm:

Domestic Coke Corporation, P16219-1505E.....	\$3, 998, 500
International Coal Products Corporation, P9844-1034E.....	2, 000, 000
Donner Union Coke Corporation, MX-21535.....	8, 500, 000
Birmingham Coke & By-Products Co., P8835-940E.....	3, 500, 000

Col. PELOT. The disbursements under this project this year as of December 31, 1919, amounts to \$1,697,100.06.

Col. RICE. It is really not an expenditure.

Mr. SLEMP. That still leaves about \$70,000,000 to be accounted for?

Col. PELOT. We had to turn over to the transportation service, I believe, about \$40,000,000. The exact expenditures under that, I do not know. I have not the figures showing those expenditures.

Mr. SLEMP. Out of the \$70,000,000, you paid the Railroad Administration \$40,000,000 for the transportation of supplies?

Col. PELOT. No, sir; it was turned over to the Transportation Service for the transportation of raw materials, equipment, completed ammunition, etc.

Mr. SLEMP. That was the railroad charge?

Col. PELOT. Yes, sir. That amount has not been expended. I am giving the amount that was turned over for transportation purposes.

Mr. SLEMP. That comes out of the \$70,000,000?

Col. PELOT. Yes, sir.

Mr. SLEMP. You have \$30,000,000 still to be accounted for?

Col. PELOT. A certain amount was turned over to the Chemical Warfare Service.

Mr. SLEMP. How much?

Col. PELOT. I have not the figures here of the expenditures under that. There were expenditures by the district ordnance officers all

over the country, but I do not know the total amount expended by them. In other words, we have not the details of the expenditures. The Salvage Board had \$7,500,000, but I do not know their expenditures.

Mr. SLEMP. We are still shy \$30,000,000.

Col. PELOT. It is estimated that about \$43,000,000 has been or will be used by the Claims Board, and \$13,000,000 was turned over to the Field Service, but I do not know how much they expended.

Mr. SLEMP. For what?

PRESERVATION AND STORAGE OF AMMUNITION.

Col. PELOT. For preservation of ammunition—the \$13,000,000.

Mr. SLEMP. Give us a brief general statement with regard to that. Have they been buying land and building houses in which to store this ammunition, or what have they been doing with the \$13,000,000?

Col. PELOT. We have been buying containers and the necessary matériel for the preservation of the ammunition that we have been storing.

Mr. SLEMP. You are not storing anything except the explosives, are you, or the powder?

Col. PELOT. The fixed ammunition requires a container in order to preserve the smokeless powder which is in the cartridge case and to prevent exposure to moisture. That is also true in the case of shrapnel for protection of the fuse assembled to the complete round. The closing-plug is required to go in the shell that are loaded, to keep the moisture out.

Mr. SLEMP. The district officers make requisitions on the general office for those amounts?

Col. PELOT. The district officers have nothing to do with the preservation of matériel. That is under the field service.

Mr. SLEMP. I meant the field service.

Col. PELOT. A reservation of \$13,000,000 was made for that purpose.

Mr. SLEMP. Is not that quite a large item?

Col. PELOT. I think not when you consider the amount of material which we have on hand that is required for war reserve purposes.

Mr. SLEMP. Where are you sending all this ammunition?

Col. RICE. It is carried all over the country, wherever we can find a place to put it. We have a great deal of it near Rock Island, at Savannah; some at Toledo; and we have a project for storehouses in Utah. We have 100,000,000 pounds of powder at the Old Hickory plant, near Nashville, Tenn. We have ammunition stored at Amatol, N. J.; at Tullytown, N. J.; and a great deal of ammunition components at Raritan, N. J., also. There are many different places where it is stored.

Mr. SLEMP. Is it all stored in Government-owned houses? On Government-owned land?

Col. RICE. I think that at the present time it is not. It is partly stored in places which we expect eventually to evacuate.

Mr. SLEMP. Are we paying storage charges on this matériel anywhere?

Col. RICE. I think we are, perhaps, paying rent in some cases. I do not think there is any charge for buildings, because, as I remember

practically all of the buildings are at places where we have erected our own buildings.

Mr. SLEMP. Do you keep a supply of ammunition generally within range of your field depots along the seacoast?

Col. RICE. We put it anywhere we can find storage space for it.

Mr. SLEMP. You have an enormous amount of it, and you will not have to make any ammunition for several years.

Col. RICE. No, sir; that is not quite a correct statement. We have an enormous amount; but, for instance, in the case of powder we will have powder that will deteriorate. Then we are also short on certain calibers of powder. The fuses are going to deteriorate. However, on the main lines of field artillery ammunition, except for reworking powder, we should not have to manufacture any very large quantity for a good many years. On the other hand, on the seacoast it will be different. So far as the standard types of projectiles are concerned, we will not have to manufacture them at any time that we can foresee. We will undoubtedly have to do something in regard to fuses from time to time, and we will undoubtedly come eventually to present propositions to you on the subject of what we will do for the preservation of powder or its disposition.

Mr. SLEMP. You are asking under this item \$1,756,000.

Col. RICE. We will not ask for any money this year for reworking powder.

DETAILS OF ESTIMATE.

Col. PELOT. The \$1,756,000 may be broadly divided into two items, one for experimental work, \$1,256,000 and the other item is for the manufacture of ammunition, \$500,000. The items covered by the experimental work are as follows:

For the development of a mechanical time fuse, \$100,000; for the development of a point-detonating fuse and base fuse for mobile artillery ammunition, \$150,000; for the development of primers, \$10,000; for the development of cartridge cases, \$20,000; for the development of common steel shell, \$150,000; for the development of semisteel shell, \$60,000; for the development of chemical shell, \$150,000; for the development of propellant powders, \$185,000; for the development of high explosives, \$80,000; for raw materials and chemicals, \$40,000; for experimental loadings and firings for field, railway, antiaircraft, and trench-mortar ammunition, \$250,000; for the experimental manufacture and test of projectiles to determine the form of maximum ballistic efficiency, \$50,000; and for the purchase and manufacture of experimental steel for test, \$11,000, making a total of \$1,256,000. In addition, \$500,000 is asked for ammunition for tank guns.

Mr. SLEMP. How much money did you expend for experimental work this year? Give your statement in the same itemized detail that you did just now?

Col. PELOT. For development ammunition for 70-millimeter infantry-accompanying gun, \$1,978.56; development point-detonating fuses, \$17,213.55; development propellant powder and explosives, \$28,820.70; determination of form of projectile for maximum efficiency, \$5,138.19; development dummy powder charges for mobile artillery, \$100; preservation of material used in maintenance, experimental and development work, \$17,883.58; mechanical time fuse,

\$429,633; development ammunition for 75-millimeter infantry accompanying gun, \$4,340.60; gas-shell adapters and boosters, \$32,064.59; antiaircraft tracer shell, \$2,228.19; shell loading and firing problems, \$13,475.13; semisteel compositions and methods, \$1,735.92; development 37-millimeter gun-pressure gauge, \$153.76; miscellaneous experimental work on ammunition development, \$1,078.55; a total of \$561,844.32.

Mr. SLEMP. The mechanical time fuse you refer to is the same as the one you referred to a while ago?

Col. PELOT. That is the same mechanical time fuse.

Mr. SLEMP. You spent \$400,000 for that purpose this year, and you want to spend \$100,000 on it next year?

Col. PELOT. Yes, sir.

Mr. SLEMP. What was the result of the experiment?

Col. PELOT. The result of the experiment is that we have a mechanical time fuse that costs about \$6 apiece. That time fuse is made by watchmakers. It is a rather expensive fuse, and we want to get a cheap reliable fuse, which will be to this fuse what the Ingersoll watch is to the Elgin or Waltham watch. We want a cheap fuse, and, at the same time, a reliable fuse. These fuses can not be considered entirely satisfactory, but there is nothing of that kind that will be made satisfactory except by manufacturing small quantities and having them tested. This is one type that can be used satisfactorily on antiaircraft guns.

Mr. SLEMP. What you have done this year justifies you in the belief that with an expenditure of \$100,000 more you can develop the type of fuse you want?

Col. PELOT. We believe we are justified in thinking that we can develop such a fuse, possibly not with 100,000 in one year but eventually.

Col. RICE. I do not want to be too positive about that, because there is nothing experimental that you can be sure you will succeed in. That problem has been brought out in hearings, and the French and Germans have both worked on this same thing.

Mr. SLEMP. Mr. Byrns questioned you last year, Colonel, in the proposition to replace 400,000 rounds detonating fuses at 75 cents a round. Did you do that at an expense of \$300,000 this year?

Col. PELOT. That referred to a different proposition, for utilization of certain service ammunition for target practice purposes. We reduced the order for mechanical fuses. It originally involved the expenditure of a great deal of money. Those fuses, as a matter of fact, we are not assembling, but we will leave them packed separately from the complete round until we are ready to use them, because of the fact that the spring should not be put into adjustment until we are ready to use them, due to deterioration.

Mr. SLEMP. You mention a tremendous amount of things in your hearings of last year that you proposed doing this year, the development of primers; the development of the 194-millimeter shell; the development of the 155-millimeter armor-piercing shell; the development of the minor caliber trench mortar shell; the development of the 3-inch mortar shell; the development of the 4-inch trench mortar shell; the development of the 6-inch mortar shell; the development of the 240-millimeter and 11-inch trench mortar shell; the development of the Livens projector shell; the trench mortar fuses; the

trench mortar combination fuse; booster for mortar shell; boosters for Livens projectors. Have you done all that work this year?

Col. PELOT. We have done very little of that work this year, because of the fact that we have been so busy in cleaning up our war orders, and there has been such a disorganization of personnel we have not effectively prosecuted experimental work.

Mr. SLEMP. In the paper I have here reference is made to a chemical shell, for which \$150,000 is requested. Are you trying to make a better shell than we have got now?

CHEMICAL SHELL EXPERIMENTS.

Col. PELOT. It is a matter of trying to complete the development now or of spreading it over a considerable period of time. If we can get \$150,000 for the development of the chemical shell we hope to be able to solve the problem that is ahead of us. We have not yet digested all that has been learned from the war in the way of the development of the chemical shell. There is a certain shell of that type that required a special interior coating in order that there will be no leakage of gas, and so that the gases of the chemical will not attack the steel. In order to apply it, for instance, porcelain requires the application of very high heat. In order to apply that high heat to the steel, it changes the quality; it so anneals it that it can not be used in the gun. That is one of the problems that has to be solved, making a lining of that nature without changing the nature of our steel.

Mr. SLEMP. Have any experiments that you have made this year brought any substantial results?

Col. PELOT. We have made no experiments and no expenditures on chemical shells this year, other than the experimentation with adapters and boosters for the chemical shell; the adapter and booster——

Mr. SLEMP (interposing). Take the shell proposition generally, have you made any development or experiment generally this year that is really of any use to us.

Col. PELOT. We have experimented with some shell of an odd caliber trying to determine the best shape of shell to obtain the greatest range and accuracy, and the results that we are obtaining are hopeful; and before the end of this year, before June 30, we hope to have some very good results.

Mr. SLEMP. Didn't you make a change in one of the projectiles, thereby increasing the range four or five thousand yards?

Col. PELOT. We changed the rotating band at that time.

Mr. SLEMP. What did that cost to bring that development about?

Col. PELOT. I have not the records on that, and it would be very difficult to obtain; it involved——

Mr. SLEMP (interposing). It was kind of a lucky find, wasn't it?

Col. RICE. There was a certain amount of luck in it for us.

Col. RUGGLES. We are going at it in a scientific way; we have made more progress in it than anybody else in the world. We are going to improve the range by the shape of the projectile, and at the

same time we are going to increase the accuracy of those guns very materially. It is a combined improvement of the range and the accuracy by the shape of the shell. It is a very expensive proposition, but one of the biggest improvements made in years.

Mr. SLEMP. I suppose you will demonstrate the unsuitability of all our shells?

Col. RICE. That has all been done now, Mr. Chairman.

Col. RUGGLES. All our shells are out of date. If anybody else goes to manufacture similar shells for the same guns they will outrange us 25 per cent.

Col. RICE. But we are changing our guns and we do not think they will get a chance to use them.

Mr. OGDEN. When you change the type of gun will that have any effect on the type of the shell you are developing?

Col. RICE. Not much.

Col. RUGGLES. We sent out some shells to the Navy and it increased their range about 4,000 yards.

Col. RICE. The thing we are not yet ready with is improvement in equipment, either in ammunition or material, but we want to have the right sort of thing ready to use when we have to make new stuff.

Mr. SLEMP. Where do you do this work?

Col. RICE. The proving grounds is where the test is made. The present work at Picatinny Arsenal.

Mr. SLEMP. And some at Frankford?

Col. RICE. Yes, sir.

Col. RUGGLES. I would like to say that some of the experiments made in one or two calibers will vary a little in the smaller guns, so that when we get this thing pretty well theoretically worked out and indicated, then we will have to go to work to try them in the different calibers of guns; it is a real big thing, the whole projectile proposition. If you can take an existing gun and increase its range by 25 per cent and you do not do it, and the other fellow does, you might as well have a lot of obsolete guns.

Mr. SLEMP. How and in what way do you figure out that your experiments will cost \$150,000; what is the theory of your estimate?

Col. PELOT. After we once obtain a design we must necessarily manufacture a small quantity of the shell; determine first whether it is practicable from the production standpoint. In the second place, we fire from a gun to determine its practicability for service use.

Mr. SLEMP. Let us take a 75-millimeter shell; how much does it cost?

Col. PELOT. A 75-millimeter shell, probably \$10.

Mr. SLEMP. \$10?

Col. PELOT. Yes, sir.

Mr. SLEMP. A new type of shell of that kind would cost probably \$25, and your time?

Col. PELOT. The estimate of \$10 I gave, I meant for—

Mr. SLEMP (interposing). For quantity production?

Col. PELOT. For a new or experimental type. The war cost of the 75-millimeter shell—

Mr. SLEMP (interposing). I am using that strictly as an illustration as to how you would figure out any of these items as \$150,000; why not say \$100,000 or \$50,000; how do you prove the necessity for that amount of money?

Col. PELOT. I have taken the different calibers of shell from 37-millimeter to 16-inch, and figured the estimated cost of a round, and assigned a certain number of rounds per caliber to be fired, and figured also the cost of the work of designing and overseeing.

Mr. OGDEN. On the 75-millimeter shell that is \$10, as I understand?

Col. PELOT. Yes, sir.

Mr. OGDEN. That includes all of this work that you spoke of?

Col. PELOT. Yes; that includes our drafting work; our designing work; it includes the manufacture of the shell, and it will include the cost of anything new that we have to get in order to test that shell.

Mr. SLEMP. Don't you think you have these items pretty much enlarged; granting the desirability of everything you say?

Col. PELOT. I think not, sir, if we are to push these experiments to a decision during the coming year and put our time in on experimental and developmental work and not on manufacturing work, which we will do. In other words, it is a matter of utilizing to the full on this alone available personnel to accomplish the work.

Mr. OGDEN. What is the cost for 155-millimeter shell?

Col. PELOT. I am estimating the cost for development at \$40. The war cost of the shell—complete round gun shell—is \$48.47; complete round howitzer was \$37.97; the shell alone, 155-millimeter, \$17.65. That was on a quantity production basis.

Mr. SLEMP. Yes. Now, just continue this item, this common steel shell, \$150,000; wouldn't you get rather good quantity production for \$150,000—more than you need to test with—or wouldn't you?

Col. PELOT. If we confine our experiments to one of the very small calibers only, the answer is yes; but in such a case our results are not conclusive, and may be even misleading.

Mr. SLEMP. Well, having tested them out, what do you do; do you put it aside, or do you make some more?

Col. PELOT. The idea is this, first to make a design and manufacture 10 or 25 shells and test them. If they appear to give results, we make any changes that may be necessary, and we may make up 50 or 100 more and test them, and, if satisfactory, then we would want to manufacture 2,000 or 3,000 or some similar number and send a quantity of them to some firing center where the Field Artillery can use them and get the criticism and opinion of the line on the serviceability of that shell.

EXPERIMENTAL POWDER.

Mr. SLEMP. Now, about your powder; you are asking \$185,000 for powder; is that experimental powder or powder that you want to use?

Col. PELOT. That is an experimental powder, and that money is asked for to carry out one of the Westervelt board recommendations, which is for a nonhygroscopic, flashless, smokeless powder. We at the present time have one or two powder manufacturers working on that problem for us.

Mr. SLEMP. Do you pay them to do that?

Col. PELOT. The order with neither company is at all to us, except for the cost of testing.

Mr. SLEMP. Would you be willing to let them try it out for a year and dispense with this \$185,000?

Col. PELOT. We have been trying it now for about six or eight months with one of the companies, and we haven't anything satisfactory yet, and I think that we will get good results only by having money at our disposition with which we can push it; and, moreover, our tests must be paid for.

Mr. SLEMP. Do you employ directly a staff of chemists on this, or do you employ contractors?

Col. PELOT. We have a staff of chemists at Picatinny Arsenal.

Mr. SLEMP. And the same at Frankford?

Col. PELOT. There are no chemists on smokeless-power work at Frankford.

EXPERIMENTAL TESTS OF AMMUNITION.

Mr. SLEMP. Experimental tests of ammunition, \$150,000; couldn't that be eliminated and have the proving grounds to make those tests for you—those experimental tests?

Col. PELOT. No, sir; because there are other problems involved, other than simply the firings; we have to utilize fuses, boosters, detonators, and propelling charges of shell; and all such elements of that kind will have to be procured, because if we are going to make the tests we want to make the tests with the latest developed components of every kind, and not with old material.

Mr. SLEMP. What about the coordination of your experimental work with the Navy's experimental work in powder and projectiles, etc.?

Col. PELOT. We are continually in conference with the Navy on those problems.

Mr. SLEMP. Is there any duplication in that work between the two organizations?

Col. PELOT. They are trying to solve some of the same problems.

Col. RUGGLES. We have an ordnance committee, on which we have a naval representative present at our meetings.

Mr. SLEMP. By "we" who do you mean?

Col. RUGGLES. A member of the Navy organization is a member of that committee; he knows all we are doing, and sometimes we make the same experiments in the two organizations; they will help us out and divide the expense between the two. They tell us what they are doing, and we tell them what we are doing; and in the matter of experimental work it is not bad to have more than one person working on it, because it depends somewhat on the brains and the ideas of the man particularly engaged, and it needs more than one mind on the experimental work, and if it has two or three or a dozen minds engaged to keep each other informed and to keep in touch with what they are doing it will be helpful. I think we are getting ourselves into a condition where the duplication is very largely eliminated. On this committee we have a representative of the Coast Artillery and a representative of the Field Artillery, and all these experiments are discussed before they are adopted.

Mr. SLEMP. Do you have representatives of the civilian organizations visit you throughout the country?

Col. RUGGLES. No; not yet; we may have later. It is a good deal to ask them to contribute yet. But we have conferences between the Navy and ourselves and the Air Service.

CARTRIDGE CASES.

Mr. SLEMP. Haven't you got enough cartridge cases on hand to run you?

Col. PELOT. Yes; but they are being designed for the 105-millimeter howitzer and other new cannon. They are guns which, in order to fire, we have to have ammunition, and we are developing a cartridge case for them; and, further than that, we may develop a cartridge case out of material other than brass, which, in the late war, was beginning to be a scarce material.

MANUFACTURE AND DEVELOPMENT OF SHELLS.

Mr. SLEMP. Unforeseen emergencies, \$500,000; couldn't you absorb that in another amount in some other way?

Col. PELOT. That is based on an unofficial request which has not yet received the approval of the General Staff; for ammunition for tank guns.

Mr. SLEMP. This will be new production?

Col. PELOT. This will be new production to provide, we might say, among other things, ammunition for guns that are in tanks at the present time.

Mr. SLEMP. Have you many tanks?

Col. PELOT. There are 114 tanks, and each of them has two 6-pounder guns.

Mr. SLEMP. What is your supply of ammunition in relation to that?

Col. PELOT. At the present time we have twenty-eight thousand one hundred 6-pounder shell, and 2,812 canister shell, or a total of 30,912. These are all of English manufacture; none of it is our product.

Mr. SLEMP. Did we make any of that type of shell at all in this country?

Col. PELOT. We have made 6-pounder ammunition many years ago. At the present time we are working on development of a 6-pounder canister of a modern design which has shown in tests to be far more satisfactory than the British canister; also on an A. P. projectile for the 6-pounder.

Mr. SLEMP. Then this \$500,000 is not for the purpose of purchasing more shells, but for the purpose of developing new types of shell?

Col. PELOT. It will be used in the manufacture and development also.

Mr. SLEMP. In the development of a better type than you now have?

Col. PELOT. Yes, sir; not only for tank guns, Mr. Chairman, but also for other types that may come up. I give tanks only as a sample of what we may need; I do not know what may come up.

Mr. SLEMP. What about the antiaircraft missiles; are you working on them also?

Col. PELOT. We are working on them. The problem there, however, resolves itself into the development of a proper fuse more than anything else. We are confining ourselves to a mechanical fuse for these shells, and using a high-explosive shell only.

Mr. SLEMP. Have you anything further to say on this subject?

Col. RICE. I might say this; as you know, we suffered considerably in the last war because of a lack of not having properly developed types——

Mr. SLEMP (interposing). We did not have any facilities for the manufacture of shells at all, did we?

Col. RICE. Practically none; we had some at Frankford.

Mr. SLEMP. Didn't we make some at Watertown?

Col. RICE. Some small, armor-piercing shells; a few field shells at Frankford. Aside from that, all the shells were made by private concerns.

Mr. SLEMP. What private concerns?

Col. RICE. I should say hundreds of them.

Mr. SLEMP. I wonder if they are preserving their machinery for those types?

Col. RICE. No, sir; except they have a few of the armor-piercing shells at the Midvale Steel Co., especially for the Seacoast Artillery.

Mr. SLEMP. Is it an easy matter to throw your facilities from shell making into gun making, or vice versa?

Col. RICE. No; it is not easy.

Mr. SLEMP. Are we taking any steps to preserve an organization for making shells, or machinery and jigs and fixtures?

Col. RICE. Yes; we have retained a shell manufacturing plant in Chicago, and we have the machinery necessary for that plant; and we have, in addition, retained some additional machinery with which we could start somebody else. We have the tools, jigs, and fixtures, and a lot more capacity at Frankford than before the war began.

Mr. SLEMP. Is that complete at Chicago?

Col. RICE. It is complete for certain calibers—the 75s, the 155s, 240s, and 4.7s.

Col. PELOT. The machinery installed is the special machinery only for the manufacture in that plant of ten thousand 155-millimeter shells and two thousand 240-millimeter shells per 24-hour day. There is also being retained equipment for installation in other plants, in case of war, for the manufacture of fifty-one thousand 75-millimeter shells, and twelve thousand 155-millimeter shells, and three thousand one hundred and sixty 240-millimeter shells, and three thousand 4.7-inch shells. The 4.7-inch equipment, however, is the only complete equipment, the other calibers being from 40 per cent to 90 per cent complete.

Mr. SLEMP. Is that production?

Col. PELOT. Yes, sir.

Mr. SLEMP. The plant that is now being operated is just fenced off and guarded and the machinery kept oiled, I suppose?

Col. RICE. The machinery has been put in position and has been kept in good condition. It is not connected up, as the pulleys are not up. It has not been established as a plant ready to manufac-

ture, because of the expense. If war should come it would take quite a little time to put it in operation.

Mr. SLEMP. Upon what would we depend for the larger type of shells?

Col. PELOT. We have the Watertown Arsenal only, and the yearly production there is about 2,400 projectiles, either 12, 14, or 16 inch caliber.

Mr. SLEMP. Have we the tools and fixtures, etc., on hand with which to organize another plant somewhere for the production of a larger type of shell?

Col. RICE. No, sir; I do not think we have. I will look that up.

Col. PELOT. No, sir; I do not think we have.

Mr. SLEMP. Has the Navy facilities for the production of those larger type shells?

Col. RICE. I do not think there is any considerable place in the country that could handle them.

Mr. SLEMP. Of a Government nature?

Col. RICE. No, sir. In fact, I am sure of it.

The CHAIRMAN. Colonel, in estimating that there would be returned to the Treasury at the end of this fiscal year \$540,000,000, did you take into consideration that all outstanding obligations heretofore entered into will be discharged and that amount returned into the Treasury? That is, all outstanding obligations created under the appropriations for the purchase, manufacture, and test of munitions for seacoast guns?

Col. PELOT. No, sir; not for seacoast guns. Only for mobile purposes.

The CHAIRMAN. So that you understand that what is not expended of that amount, under the provision carried in the last bill, is turned into the Treasury and canceled?

Col. PELOT. Yes; I understand that.

The CHAIRMAN. You are not asking anything in the way of an appropriation for the payment of any contract entered into because of the war?

Col. PELOT. No, sir.

The CHAIRMAN. Your estimate is that all those will be paid before that date?

Col. PELOT. There may be some, Mr. Chairman, that will not be paid. I do not know the number. That is something that may have to be brought to the attention of Congress or the Court of Claims.

The CHAIRMAN. Whenever that amount is determined?

Col. PELOT. Yes, sir.

Col. RICE. That condition is general, Mr. Good. They are doing the best to close out, by executing the contract and making final payment before June 30, but it is so difficult and complicated that we do not know whether it will be accomplished by that time or not.

The CHAIRMAN. I understand. I was just anxious to know what the situation was in regard to this appropriation. You will be sure to submit a statement of your expenditures for this year?

Col. RICE. Yes, sir.

Expenditures under "Armament of Fortifications, C," July 1, 1919, to Dec. 31, 1919.

	Total disbursements.	Disbursements on claims.	Disbursements other than on claims.	Amount disbursed on Ammunition Division orders.		Balance representing amount disbursed on outstanding orders other than covered by two preceding columns. ¹
				Placed since July 1, 1919.	Current, placed prior to July 1, 1919.	
C.....	\$93,561,064.80	\$42,433,763.23	\$51,127,301.57	\$1,878,328.48	\$564,794.95	\$69,908,531.18
C, act June 15, 1917.....	21,800,883.03	576,529.99	21,224,353.04	.....	.....	.....

¹ This includes Field Service, Salvage Board, Construction Division, Chemical Warfare Service, Transportation Service, district offices, etc., but does not include claims (second column).

FRIDAY, MARCH 26, 1920.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION FOR SEACOAST CANNON.

Mr. SLEMP. The next item is:

For purchase, manufacture, and test of ammunition for seacoast cannon and for modernizing projectiles on hand, including the necessary experiments in connection therewith, and the machinery necessary for its manufacture, \$31,596,638.

The revised estimates call for \$11,505,883. Give us the state of your balances.

Col. PELOT. The Treasury balance on March 5, under H, was \$5,780,843.58, of which \$1,267,709.46 is the unallotted balance and \$4,513,134.12 represents the amount due on contracts and orders. Under H 1910-20, the Treasury balance was \$855,383.57, of which \$732,834 is the unallotted balance and \$122,549.57 is the amount due on contracts and orders. Under H, act of June 15, 1917, the Treasury balance was \$2,653,169.13, of which \$147,820.46 is the unallotted balance and \$2,505,343.67 is the amount due on contracts and orders.

Mr. SLEMP. Generally speaking, are those various items you refer to as being due on contracts and orders simply reservations?

Col. PELOT. Yes, sir; and contracts entered into, the majority of them, during the war.

Mr. SLEMP. Do you expect to expend the full amount of your allotments during this fiscal year?

Col. PELOT. We expect to be able to return to the Treasury June 30 about \$2,617,000, and we hope to be able to place additional orders under H before June 30 of this year.

Mr. SLEMP. You mean by that that you will obligate some of the money you now have on hand before next year?

Col. PELOT. Yes, sir.

Mr. SLEMP. How much do you estimate?

Col. PELOT. We want to place an order for 500 16-inch AP shot, \$500,000; 1,000 14-inch AP shot, \$700,000; to complete the modification and loading of 40,000 base detonating fuses, \$70,000; experimental projectiles, \$25,280.

Mr. SLEMP. Have you the money on hand now to pay for that?

Col. PELOT. The money is on hand; yes, sir; in the unallotted balances.

Mr. SLEMP. The money you will return to the Treasury, then, will be exclusive of the amount you have set aside for this purpose?

Col. PELOT. Yes, sir.

Mr. SLEMP. You received last year, under armament of fortifications H, \$855,442. Did you spend all of that this year?

Col. PELOT. We have allotted to March 5 only \$122,549.57.

Mr. SLEMP. How much money have you spent this year under A. of F. "H" from all appropriations?

Col. PELOT. Between July 31 and December 31, 1919, the disbursements under H have been \$538,911.88. Under H, act of June 15, 1917, \$62,448.67.

Mr. SLEMP. What per cent of that was for work started before the beginning of the fiscal year and what per cent for work started after the fiscal year or on new production?

Col. PELOT. The actual disbursements on work started since July 1, 1919, have been only \$421.86.

Mr. SLEMP. Practically all work was started before the fiscal year?

Col. PELOT. Yes, sir.

STATUS OF SEACOAST-AMMUNITION SUPPLY IN RELATION TO BOARD OF REVIEW PROJECT.

Mr. SLEMP. Can you give a general statement as to the status of our seacoast-ammunition supply?

Col. PELOT. We have been building up a supply of seacoast ammunition under the so-called board of review project, which has been referred to a number of times in hearings before this committee in previous years.

At the present time there is either on hand or under manufacture sufficient projectiles to complete the board of review project for all cannon that have been installed in fixed emplacements, with the exception of the 3-inch 15-pounder model, 1903, for which we hope to be able to place orders for about 30,000 rounds, to complete the allowance for that model, with funds now available; and 3-inch 15-pounder gun, model 1898-1902, for which supply is not now expected to be completed. There are certain guns included in this project which have now been declared obsolete, and the board of review project, as far as ammunition is concerned, has not been built up for those guns. The proportion of shot to shell has not been kept at the proportion originally recommended by the board of review although very nearly so. The status of the ammunition supply November, 1915, I am unable to give at this time and would have to furnish by memorandum.

We have sufficient powder in bulk on hand to complete the charges for guns now installed under the board of review project, under the assumption that the seacoast guns are given preference over the mobile artillery, but that powder has not been made up into propelling charges nor have we sufficient cartridge storage cases at the present time to preserve and store those charges in the coast defenses. I am referring now only to the guns that are manufactured and emplaced.

Mr. SLEMP. So the summing up would be that for all guns which you do not consider obsolete, beginning with the 12-inch long-range gun and the 12-inch mortar, and including all calibers, you have a supply of ammunition corresponding to what the board of review project called for in 1915 for continental United States?

Col. PELOT. We have the ammunition supply either on hand or under order for guns and mortars 12-inch and above that are emplaced, with exception of a certain type of fuse, some cartridge storage cases, cartridge bags, and the loading of about 30,000 projectiles.

Mr. SLEMP. Have you an excess supply of ammunition for any of these caliber of guns in the continental United States; if so, what calibers and what amounts?

Col. PELIOT. For the 6-inch gun, there is a surplus of shot and shell; for the 8-inch gun, there is a surplus of shot and shell; for the 10-inch gun, there is a surplus of shot and a deficit of shell; for the 12-inch gun there is a surplus of shot and a deficit of shell; for the 14-inch gun there is a surplus of shot and a deficit of shell; for the 16-inch gun a surplus of shot and a deficit of shell; for the 12-inch mortar a surplus of projectiles. These deficits and surpluses as given are based on the old board of review allowances only for cannon in fixed emplacements.

Mr. SLEMP. You said a while ago that you had placed orders for the manufacture of all the types and amounts you wanted of shell so as to bring all these projects completely up to the board of review project, and that some of them were under manufacture now.

Col. PELOT. I do not want to mix the words "shell and shot" together, because we placed orders for shot or we have changed the orders of shell to shot as far as practicable to complete or practically complete the Board of Review project. There may be and there are a few deficits in shell which it is not desirable to fill, but where the deficit of shell is greater than the surplus of shot, we should probably want at least to fill this difference with shot if we are not given funds for the project carried in this year's estimates.

Mr. SLEMP. You have on hand money enough to pay for any deficit for all calibers of ammunition for seacoast cannon to meet fully the Board of Review requirements as of 1915?

Col. PELOT. Yes, sir; but we may not be able to obligate funds required for deficiencies in fuses, cases, etc., referred to previously, before June 30.

Mr. BYRNS. I understood you to say a while ago that the board which has taken the place of the Board of Review promulgated orders for a greater requirement or reserve than was contemplated by the Board of Review in its order of November, 1915. Is that correct?

Col. PELOT. That is correct. The orders were issued by the War Department.

Mr. BYRNS. Does this surplus to which you have referred fully represent the requirements of this new board?

Col. PELOT. No, sir; by no means.

Mr. SLEMP. You have no 16-inch guns emplaced in the United States in the seacoast defenses?

Col. PELOT. We have not, but there are under manufacture at the present time thirteen 16-inch guns and thirteen 16-inch howitzers.

Mr. SLEMP. Have you any 14-inch guns emplaced in continental United States?

Col. PELOT. There are four 14-inch guns in continental United States, and in the insular possessions there are 20. The first four, I believe, are in the coast defense of San Pedro, Los Angeles.

Mr. SLEMP. Have you a supply of projectiles for those four guns?

Col. PELOT. Either on hand or under manufacture equal to the Board of Review allowance.

Mr. OGDEN. Before you leave the Board of Review project, I would like to ask this question, whether or not that project contemplated complete rounds for all your guns?

Col. PELOT. It did contemplate complete rounds.

Mr. SLEMP. Have you an ample supply for the 14-inch guns on railway mounts, either under order or in existence?

Col. PELOT. We have not. We have high-explosive shell suitable for field use only and not against naval targets for the guns on railway mounts, with the exception of additional field projectiles remaining from those purchased from the Navy Department which, I believe, went to France and were returned.

The CHAIRMAN. Colonel, do you remember how much the estimated cost was for supplying all the ammunition for seacoast cannon under the Board of Review project?

Col. PELOT. I have that in the report of the Board of Review.

The CHAIRMAN. How much was it?

Col. PELOT. The board's estimated cost of completing the increased allowance of ammunition proposed by the board for defenses existing in 1915 was, for continental United States, \$20,166,362; insular possessions, \$7,384,500; Panama Canal, \$3,682,000. For the additional armament proposed by the board, the estimated cost of ammunition was as follows: Continental United States, \$9,467,638; insular possessions, \$1,571,500; Panama Canal, \$4,573,000, making a total of \$46,845,000. The Ordnance Department's estimate of the value (in 1916) of the ammunition allowance for the armament contemplated by the board of review's complete project, was as follows:

Continental United States	\$42,378,000
Insular possessions	12,359,000
Panama Canal	10,388,000

The CHAIRMAN. You have had a grand total of appropriations since that time of \$35,935,442. I wish you would put in the record a statement showing in percentages the information you have already detailed as to how you have met the requirements up to this time; showing in percentages the amount of overproduction and the amount of underproduction, as measured by the board of review project. (Note.—This information was furnished by letter.)

Mr. SLEMP. In regard to your 14-inch and 16-inch projectiles, respectively, do you divide those projectiles generally into the terms shot and shell?

Col. PELOT. Yes, sir.

Mr. SLEMP. What is the exact technical difference between the terms "shot" and "shell"?

Col. PELOT. The shot is a projectile with better armor-penetrating qualities than the shell.

Mr. SLEMP. Is that known as the armor-piercing projectile?

Col. PELOT. Yes, sir; that is the armor-piercing projectile. That projectile has a comparatively small bursting charge and is tested for acceptance against armor plate of a thickness equal to the caliber of the projectile. The armor-piercing shell is a projectile with a large bursting charge which is tested for acceptance against armor plate of only one-half its thickness.

Mr. SLEMP. You have an ample supply of 14-inch shell, have you not?

Col. PELOT. All of the 14-inch shells we have on hand are obsolescent, and there is a deficit under the board of review allowance for guns now emplaced.

Mr. OGDEN. You expect to use them in target practice, do you not?

Col. PELOT. If we can obtain funds to manufacture shot to replace the shell we have on hand. When this program has been met, we hope to use the shell for target practice.

Mr. SLEMP. The Navy has on hand 20,000 14-inch projectiles, 1,000 13-inch projectiles, and 20,000 12-inch projectiles, all of them being armor-piercing projectiles. That represents their excess. Could you utilize those armor-piercing projectiles that the Navy has on hand in excess of their requirements for your purposes?

Col. PELOT. I can say confidently that those projectiles are among the Navy's second-rate projectiles. They correspond, I expect, very favorably with our armor-piercing shell, but they represent a type of projectile that I understand the Navy is not manufacturing to-day. Some of them, I believe, were made as far back as 1910, and I understand none of them were tested against armor plate at 10 degrees oblique impact, which we consider necessary at the present time. They were, I understand, tested for acceptance at normal impact.

Mr. SLEMP. You do not think you would have any use for them?

Col. PELOT. We would have no use for them against naval targets.

The entire program, assuming that the board of review's project with reference to cannon is completed, and, including the railway project, amounts to \$216,968,279.52; the ammunition for the railway project amounts to \$47,529,579, of which we are asking only \$1,198,758 this year, and for the armament now emplaced the total cost is \$126,946,324.72. The latter item is for armament in fixed emplacements. For armament under construction for fixed emplacements, the cost of ammunition is \$15,809,287.50, for remainder of ammunition project for guns not yet under manufacture, \$26,683,087.50.

Mr. SLEMP. And you are asking this year how much?

Col. PELOT. Under H we are asking for manufacture of ammunition a total of \$10,752,283; under H, insular possessions, we are asking for \$3,511,182; and under H, Panama Canal, we are asking for \$2,137,098, or a total of about \$18,000,000.

DETAILS OF ESTIMATE.

Mr. SLEMP. Will you give the items under the estimate?

AMMUNITION FOR 16-INCH GUNS AND HOWITZERS.

Col. PELOT. The first item is for the manufacture of complete rounds of the thirteen 16-inch gun and the twelve 16-inch howitzer

ammunition to meet the present program for those calibers now under manufacture for emplacement in continental United States, \$4,327,143.

Manufacture complete rounds 14 and 16 inch guns and howitzers now being manufactured-----	\$4, 327, 143
Complete rounds for 14-inch ammunition for railway guns-----	1, 198, 758
Replacement of 12 and 14 inch A. P. shell-----	3, 825, 147
Replacement of obsolete cartridge storage cases-----	308, 408
Replacing fuses-----	544, 288
Replacing old powder charges in coast defenses-----	239, 539
Complete loading of A. P. and D. P. shell-----	315, 000
	<hr/>
	10, 752, 283
Experimental and development work-----	753, 600
	<hr/>
Total -----	11, 505, 883

Mr. SLEMP. Or an estimated final cost of how much?

Col. PELOT. An estimated final total of \$8,654,287.

Mr. SLEMP. You want 50 per cent of it this coming year?

Col. PELOT. Fifty per cent, because we expect the guns and howitzers to be completed and emplaced in two years.

Mr. SLEMP. These are armor-piercing shell?

Col. PELOT. These will be the latest type of armor-piercing shot.

Mr. SLEMP. No shell?

Col. PELOT. No, sir.

Mr. OGDEN. The emplacements for those guns have not been started, or even authorized, have they?

Col. PELOT. I am not qualified to state whether the emplacements have been authorized or not.

Mr. OGDEN. Unless the emplacements are constructed, and the guns mounted during the year 1921, you will not need this money, will you?

Col. PELOT. Until the guns have actually been emplaced, of course, they can not be fired, but when we have the guns and carriages complete, they will be of no value whatever without the ammunition.

Mr. OGDEN. And, of course, the ammunition will be of no value unless the guns are emplaced.

Col. PELOT. No, sir; but in an emergency if we have the guns and ammunition I believe they can be very quickly put on temporary mounts or in temporary emplacements and fired while under such conditions; without ammunition the guns would be worthless.

Gen. RICE. There is one emplacement under construction now for a 16-inch gun.

Mr. SLEMP. They will not be completed until the fiscal year 1922?

Col. RICE. That is only two years.

Mr. SLEMP. How long does it take to make the 16-inch shell after giving the order?

Col. PELOT. To do the experimental work that is required, to place the contract, and to get into production would require at least six months, if not longer. We estimate that it would require two years' time, approximately, to complete those shells after we get the money—that is, the projectiles that we are asking for this year.

Mr. OGDEN. How many guns do you expect to complete in 1921 of the 16-inch-caliber?

Col. PELOT. My recollection is that more than one-half of them will be completed before the end of the fiscal year 1921, and by the end of the fiscal year 1922 the entire 13 will be completed.

AMMUNITION FOR 14-INCH RAILWAY GUNS.

Mr. SLEMP. Taking these items up in order, what have you to say about item No. 2, covering complete rounds for railway guns. You have only one railway gun mounted, or one 14-inch railway gun mounted, and no authorization for the construction of any more. How do you justify your request for this ammunition?

Col. PELOT. This request is based on the estimate for the manufacture of mounts for twelve 14-inch guns. There are forty-two 14-inch guns under construction, for which 12 mounts have been requested this year.

Mr. SLEMP. You would not expect to complete those 12 mounts this year?

Col. PELOT. It is estimated that 12 guns will be completed in 1922, and ammunition for 12 of the guns is requested on the two-year basis.

REPLACEMENT OF 12 AND 14 INCH ARMOR-PIERCING SHELL.

Col. PELOT. The next item represents the increased reserve and replacement of shell by shot for the 12 and 14 inch guns now employed in the United States. The total for that project is \$19,115,735. That has been placed on a five-year basis, and, therefore, the amount requested this year is \$3,823,147. The replacement of shell for the 12-inch calibers is 1,200, at a cost of \$600,000; increased reserve, 5,247, at a cost of \$3,173,067; for the 14-inch caliber the replacement is 119, at a cost of \$83,300; and the increased reserve is 184, at a cost of \$167,100.

Mr. SLEMP. You have the board of review's requirement of the new type of shell for 14-inch calibers?

Col. PELOT. No, sir; we have not the board of review's requirement for either the 12-inch or the 14-inch calibers, although we have on order their requirement for shot. There is a number of shells of both calibers on hand. Where I used the word "replacement" I referred to the replacement of shell by modern shot.

Mr. SLEMP. What does it cost to replace one of these shell?

Col. PELOT. The estimated cost of the replacement of a 12-inch shell is \$500, and of a 14-inch shell, \$700 at the present time.

Mr. SLEMP. You do not utilize the old shell itself in the production of the new shell?

Col. PELOT. No, sir; it is new production entirely, requiring new forgings and new castings from the very beginning.

Mr. OGDEN. Are the projectiles that you are proposing to supply the fortifications with of the present type?

Col. PELOT. No, sir; we expect it to be a projectile that will be tested under greater severity than we have ever tested any of our seacoast projectiles heretofore.

Mr. OGDEN. Have you developed the type that you expect to provide the fortifications with?

Col. PELOT. We have not yet actually made tests, but specimens are on hand at the Aberdeen Proving Grounds and tests are expected to be made this week or next. However, the Navy Department since 1916 has been making projectiles that they have tested under conditions nearly as severe as we intend to manufacture and test the shot which we hope to get.

Mr. OGDEN. It is not an approved projectile as yet, as I understand, from your standpoint.

Col. PELOT. It is not as yet, but we are confident it can be accomplished, because the Navy has something very comparable to it, and we have information that foreign Governments, an English manufacturer in particular, is manufacturing a projectile similar to the type we want to get.

REPLACEMENT OF OBSOLETE CARTRIDGE STORAGE CASES.

Mr. SLEMP. The next item is replacement of obsolete cartridge storage cases. In what respect are the storage cases you now have obsolete.

Col. PELOT. The storage cases we now have on hand are sealed by a strip soldered around the top. The cases are necessarily handled, the strip becomes loosened, they can rarely be soldered tightly, and are not airtight. The powder that is stored therein for the propelling charge therefore deteriorates more rapidly than if we had an airtight seal. The cartridge cases which we propose to buy have an entirely different type of seal and should preserve better and we hope give the powder a much longer life than it now has.

Mr. SLEMP. What life do the cartridge cases you now have provide for these charges?

Col. PELOT. It depends upon where the powder is stored, and it also depends upon the manufacture of powder. Powder in some cases will deteriorate in 2 or 3 or 4 years and in other cases will last as long as 15 years or more.

Mr. SLEMP. What is your experience with regard to that with reference to the cases you have on hand?

Col. PELOT. We have not had the present cases we are using on hand to the full life of the powder, which we normally estimate at 15 years, but our experience has been that powder stored in climates such as Panama, the insular possessions, and the Gulf Coast have, deteriorated much more rapidly than in the northern climates, and that can be due most probably to moisture getting into the case.

Mr. SLEMP. Have you had any practical trouble so far in the use of the powder you have had in these storage cases or is your suggestion simply a theoretical suggestion. Have you made any experiments where the shot failed to fire and if so, to what extent?

Col. PELOT. We make surveillance tests of all powder stored in fortifications or stored in bulk elsewhere. By these tests we are able to tell when powder is getting to a dangerous condition such that it must be withdrawn from fortifications and either destroyed or reworked.

Mr. SLEMP. We are talking now about the test you have made of these cases.

Col. PELOT. The powder that is in the coast defenses is all stored in the present type of cases, and a surveillance test is made of this

powder. Now, then, the powder that is stored in the damp climates, as in the insular possessions and in the South, deteriorates much more rapidly than the powder stored in the North. We have not taken these new cases any place and made a test on the powder stored in the cases, as compared to that stored in the present type of case, but this estimate is a result of experience with powder and cases stored in the coast defenses. We have tested for years many of the present-type cases in the coast defenses and find they leak. Knowing the deleterious effect of moist air on powder, the conclusion is that the leaks in these cases are responsible for a more rapid deterioration of powder than would result in a case with an air-tight seal. This is partly a practical and partly a theoretical conclusion.

Mr. OGDEN. You wish to supplement the present number of cases with the new cases, which involves how much of an expenditure?

Col. PELOT. To obtain new cases for propelling charges for which we have powder now in bulk, but not in the coast defenses, \$67,992 out of the \$308,408.

Mr. OGDEN. And that is by reason of the fact you are increasing the reserve amount of ammunition in the fortifications?

Col. PELOT. No, sir; that is only to complete the number of propelling charges at the fortifications under the old Board of Review project and is not an increase over that project in accordance with the new policy at all.

Mr. OGDEN. Is it an increase over the amount of ammunition that you carried as reserve ammunition in the fortifications before the war?

Col. PELOT. It is an increase over what we had available before the war, but not an increase over what was authorized.

REPLACING FUSES.

Mr. SLEMP. The next item is for replacing fuses, \$544,288.

Col. PELOT. Last year we asked for and obtained some money under H, and one of the items for which we wanted the money was for the replacement of fuses. We have been able to place orders for the manufacture of a suitable nondelay-action fuse, but we have not yet developed or have been able to place orders for a delay-action fuse.

Furthermore, the nondelay-action fuses we have under manufacture are not yet in the coast defenses, and therefore we have not been able to put them into projectiles. We are asking for \$133,494 out of the \$544,288 to cover the cost of inserting fuses now on hand in the projectiles in the coast defenses and \$370,794 to cover the cost of manufacture of 61,799 delay-action fuses, for which the designs have not yet been completed, but the tests of the experimental fuse so far have been very promising; and \$40,000 for the acceptance tests of the delay-action fuses which we propose to manufacture.

Mr. SLEMP. Under another item, do you not ask for a lot of money for the purpose of experimenting and developing a new fuse?

Col. PELOT. That is to carry on the experimentation on the delay-action fuse for which we are asking money here to cover the cost of manufacture of a quantity when an acceptable type has been developed.

Mr. SLEMP. Suppose your experimental and development work should lead you to decide that another type of fuse was better than

the one you are now asking money to manufacture, what would you do then?

Col. PELOT. If we got the money for the manufacture of fuses, and we were able to develop a better fuse than the one we now have on hand——

Mr. SLEMP. You would then not need this amount of money?

Col. PELOT. I do not think we can afford to delay the manufacture of fuses for seacoast defenses until such time as we can perfect an ideal fuse.

Mr. SLEMP. You have on hand already fuses of the old type, have you not?

Col. PELOT. We have fuses of the old type on hand, but I would like to say in that connection that our experience with a fuse of practically the same type inserted in mobile-artillery ammunition during the war, when used in the training camps, gave such results that we had to get out orders prohibiting the firing of ammunition assembled with those fuses.

Mr. SLEMP. Were the fuses to which you referred the ones that were used in the European war?

Col. PELOT. No, sir; they were not used in the European war. They were in our seacoast shell, but none of them was ever sent to France.

These are base fuses and are not point fuses.

REPLACING OLD POWDER CHARGES IN COAST DEFENSES.

Mr. SLEMP. The next item is for replacing old powder charges in coast defenses. Is this the same item as the one for the cartridge cases?

Col. PELOT. This is a different proposition, sir. We have a large amount of bulk powder on hand, accruing from manufacture during the war. One battery in the coast defenses may be provided with numerous lots of different manufacture, some new powder and some very old powder; some manufactured by the Du Pont Co., some by the Government, and some by other manufacturers; and a battery in an engagement is at quite a disadvantage if it is furnished with five or six different kinds of powder, because one lot may give entirely different results from another lot. What we want to do is to replace those various lots by one lot of powder. Where there is powder on hand in the coast defenses, and it can be shifted around from one battery to another, if it is for the same caliber of gun, we will simply make the shift and save as much expense as we can in that way, but there will be a great many lots of such small quantity that you can not provide all the powder of one lot to a battery from the charges already made up.

Mr. SLEMP. You already have the powder charges there, and this is simply for replacing?

Col. PELOT. We have the powder in bulk. Now, we want to make that bulk powder up into propelling charges and ship it to the batteries to replace the old powder which may be of many lots.

Mr. SLEMP. Have you made an investigation as to whether the old powder is now defective?

Col. RICE. If I may say something on that, Mr. Chairman, it is not a question of defective powder. It is a matter of varying velocity.

Different lots vary, within certain limits, in their characteristics as to the velocity given the projectile when it is fired, and if you have broken lots of different kinds you get inaccuracy of fire. Even in the field artillery in France they were very insistent in all the services, foreign as well as our own, in having only one lot for that reason. It is quite as important, if not more so, in the Coast Artillery, where the cost per round is so enormously greater.

COMPLETING LOADING OF A. P. AND D. P. SHELL.

Mr. SLEMP. The next item is for completing loading of A. P. and D. P. shell.

Col. PELOT. Those projectiles are now under manufacture or on hand, and the loading has not been completed. There are about 38,900 projectiles which are under manufacture or on hand and loading not completed, and the loading will not be completed by June 30, and in order that we can complete them and send them to the coast defenses for the completion of the board of review project we are asking money for that purpose.

Mr. SLEMP. This relates to what kind of shell?

Col. PELOT. They are shell and shot, varying in caliber from 6 inch to 16 inch. For instance, there will be 150, I believe, 16 inch.

Mr. OGDEN. This is really an expense incident to the loading of the shell that you are asking for \$315,000 to enable you to do, and, as I understand, you will have about 30,000 shell remaining to be loaded after June 30?

Col. PELOT. Yes, sir.

Mr. OGDEN. What are the items of expense?

Col. PELOT. The estimated average cost of loading is \$8 each. The cost of crating averages \$2.50 each. While we have the shell under manufacture or on hand at our arsenals, they are not on hand in the coast defenses. Of the 38,000 we hope to load to complete the board of review project, 8,000 should be loaded by June 30, and there still remains 30,000 to be loaded after that.

Mr. SLEMP. Is this loading process a long process? How many will an ordinary force at the arsenal load in a day?

Col. PELOT. With the facilities we have on hand we could not possibly, at the maximum, load more than 100 of the medium-caliber shell—that is, 8-inch or 10-inch—in a day.

Mr. SLEMP. Then it would take about 10 months to load 30,000?

Col. PELOT. Yes.

EXPERIMENTAL AND DEVELOPMENT WORK.

Mr. SLEMP. The next item is for experimental and development work, \$753,600.

Col. PELOT. The items are as follows: For the development of a base detonating fuse of delay-action type for armor-piercing projectiles, \$75,000; for the development of armor-piercing projectiles \$400,000; for the development of propellant powders, \$50,000; for the development of high explosives, \$40,000; for ballistics investigations, \$35,000; for raw materials and chemicals, \$20,000; for experimental loadings and firings for seacoast artillery ammunition \$100,000; for the experimental manufacture and test of projectile

to determine the form of maximum ballistic efficiency, \$25,000; for the purchase or manufacture of experimental steel for tests, \$8,600.

Mr. SLEMP. Have you spent any money on this particular program this year?

Col. PELOT. We have not yet expended any money, although we have placed a few orders and anticipate placing an order amounting to \$25,000 within a few days.

Mr. SLEMP. Where are these orders generally placed and where is the work done?

Col. PELOT. Watertown Arsenal and commercial firms, such as Midvale Steel Co., Bethlehem Steel Co., Washington Steel & Ordnance Co., etc.

Mr. SLEMP. You have a large item of \$400,000 to develop an armor-piercing shell, and I presume the effect of that would be to get a shell which would render obsolete all the \$216,000,000 worth of shell you are contemplating in the War Plans Division, would it not?

Col. PELOT. No, sir; we want to develop a projectile which will penetrate armor plate at 20° impact, if possible; otherwise at 10°.

Mr. SLEMP. What thickness of armor plate?

Col. PELOT. This will be for penetration by armor-piercing shot of a thickness of armor plate equal to the caliber of the projectile, no matter what size it is—14-inch, 12-inch, or 16-inch.

Mr. SLEMP. Is that the theory on which the shell are constructed?

Col. PELOT. Yes, sir; except for the fact that we are not going to test any projectiles against armor plate of a thickness greater than that used on any of the battleships, and that greatest thickness at the present time is, I believe, 13½ inches, so that the 14-inch or 16-inch projectile would be tested against 13½-inch plate, while the 12-inch would be tested against 12-inch plate.

Mr. SLEMP. You would not need any armor-piercing shell for 12-inch guns under the theory that the modern battleship has an armament of more than 12 inches?

Col. PELOT. The 13½-inch plate, I believe, is used on the turrets, while the armor on the water line, as a rule, is of less thickness than that, and the 12-inch gun, as noted in the new War Department policy, is one of the major-caliber cannon to be used for firing at naval targets with armor-piercing projectiles.

Mr. SLEMP. Colonel, what is your method of arriving at \$400,000, say, to use in this work? How do you arrive at the conclusion that that is the necessary amount to be spent for that purpose? Why not use \$100,000 or \$1,000,000?

Col. PELOT. We estimate the cost of a projectile made experimentally at about \$1,500—either 14-inch or 16-inch. We estimate that it will take a total of about 200 experimental projectiles to reach a decision.

Mr. SLEMP. That would be \$300,000.

Col. PELOT. The cost of a ballistic test is about \$5,000 per round. That includes the purchase of armor plate, the manufacture of powder, and other necessities.

The CHAIRMAN. My recollection of the hearings for a number of years on this subject is that it has always been stated that, naturally, the coast defenses of the country are progressive, and that the rate of their progress is determined solely by the progress of the offensive.

Col. RICE. That should be the immediate consideration. Some part of this money has been used, and I will get the exact figure later, for manufacture for seacoast guns and field artillery intended for the forces in France.

The CHAIRMAN. Do you mean that some part of it was diverted from the procurement of ammunition to the manufacture of guns?

Col. RICE. No, sir; some of it was used during the war for ammunition destined for use in France.

The CHAIRMAN. For guns of the larger calibers on the other side?

Col. RICE. Yes, sir.

Mr. SLEMP. For field work?

Col. RICE. For field work, as well as for seacoast artillery.

Mr. SLEMP. I wish you would give us that amount.

Col. PELOT. That amount is as follows:

Estimated amount expended during the period Apr. 8, 1917, to Feb. 28, 1919, for ammunition for use by the American Expeditionary Forces under appropriations for seacoast ammunition.

Armament of fortifications H:

Projectiles-----	\$878,331.41
Powder-----	2,000,000.00
Miscellaneous ammunition components-----	1,000,000.00
Total-----	<u>3,878,331.41</u>

Armament of fortifications, Panama Canal H:

Projectiles-----	57,509.02
Miscellaneous ammunition components-----	500,000.00
Total-----	<u>557,509.02</u>

Fortifications in insular possessions H:

Projectiles-----	7,750.00
Powder-----	750,000.00
Miscellaneous ammunition components-----	245,000.00
Total-----	<u>1,002,750.00</u>

Total projectiles:

Armament of fortifications H-----	878,331.41
Armament of fortifications, Panama Canal H-----	57,509.02
Fortifications in insular possessions H-----	7,750.00
Total-----	<u>943,590.43</u>

Total powder:

Armament of fortifications H-----	1,000,000.00
Fortifications in insular possessions H-----	750,000.00
Total-----	<u>2,750,000.00</u>

Total miscellaneous ammunition components:

Armament of fortifications H-----	1,000,000.00
Armament of fortifications, Panama Canal H-----	500,000.00
Fortifications in insular possessions H-----	245,000.00
Total-----	<u>1,745,000.00</u>

Grand total-----	<u>5,438,590.43</u>
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CONSUMPTION OF AMMUNITION IN WAR.

Col. RICE. Right immediately and in the future, of course, the production is going to cost twice as much as the old production did. That is another factor to be considered. Another point is as to the quantity. The question as to whether the total quantity provided for guns should be a fraction of the accuracy life of the gun or equal to the accuracy life of the gun is a question that determines the amount of ammunition you will give. I want to say, further, that one of the lessons of the war that we have learned is that our estimates as to the amount of ammunition, or artillery ammunition, that would be used in warfare were hopelessly small. Nobody in the world conceived before the war of the use in war of one-fourth or even one-tenth of the ammunition that was required. Ammunition was the main problem. Therefore, the findings of the board of review in 1915 must be taken and considered in the light of what we have learned by actual experience in the war. However, Gen. Coe will answer that question.

Mr. SLEMP. Right on that point, if you will pardon this interjection, so far as seacoast ammunition is concerned, there is no expenditure of it in the field. That is to say, you have not anything in your experience, so far as the firing of guns along the seacoast of France, Italy, and Belgium is concerned, to indicate the supply that would be required, or there was nothing in the war experience that would justify with respect to ammunition for seacoast fortifications the inference or statement advanced in regard to the supply of field ammunition.

Col. RICE. We did not have that test, of course.

Mr. SLEMP. In other words, the fact that the guns are there on the seacoast, with the amount of ammunition now provided, seems to be a deterrent. They do not have to use them so much.

Col. RICE. We have not the figures, and, of course, the comparison is not direct or conclusive.

Mr. SLEMP. I did not want the statement to go into the record unchallenged that the use of ammunition in the field would necessarily be a guide to the quantity of ammunition to be supplied for seacoast armament.

Col. RICE. It is a guide to this extent, that our experience in battle, so far as we have had it in this war—

Mr. SLEMP (interposing). But that was in the field.

Col. RICE. Our experience in this war, so far as we were concerned, was in the field; but our experience, so far as we have gone in this war, points to the increased use of ammunition, and there is no possible question in my mind but that it will increase in seacoast artillery just as much as in the field.

Mr. SLEMP. But that is not justified by actual experience.

Col. RICE. It is not a matter of official record.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION, SUBCALIBER GUNS, SEACOAST ARTILLERY (UNITED STATES).

Mr. SLEMP. The next item is "For purchase, manufacture, and test of ammunition, subcaliber guns, and other accessories for Sea-

coast Artillery, including the machinery necessary for their manufacture, \$955,386." This comes under fortifications "K."

Col. PELOT. Yes, sir.

Mr. SLEMP. You asked originally for \$955,386. and that has been reduced to \$217,010.

Col. PELOT. Yes, sir.

Mr. SLEMP. Give the state of your balances.

Col. PELOT. The Treasury balance under K on March 5, 1920, was \$1,733,385.71, of which \$1,091,000.31 is an unallotted balance, and \$642,385.40 represents the amount due on contracts and orders. The Treasury balance on March 5, 1920, under K, 1919-20, was \$1,000,000, of which \$997,200 is an unallotted balance, and \$2,800 is due on contracts and orders. The Treasury balance under K, act of June 15, 1917, on March 5, 1920, was \$518,237.16, of which \$423,168.07 is the unallotted balance, and \$95,069.09 represents the amount due on contracts and orders. Of the total amount on hand under K, 1919-20, and under K act we expect to be able to return to the Treasury on June 30 approximately \$1,510,000.

Mr. SLEMP. Is this \$1,510,000 included in the estimated amount of money to be recovered that was referred to yesterday by Col. Gatchell?

Col. PELOT. Yes, sir; it is included in that, but is shown there as \$1,905,000, I believe, because there had not been taken into consideration in that statement all future orders which we hope to place.

Mr. SLEMP. Referring to the remaining part that you have on hand, that you say covers orders, claims, etc., is that in the nature of a reserve against claims, a part of which may be returned to the Treasury, or is it all for material actually to be delivered? Can you differentiate that?

Col. PELOT. We expect to spend by June 30, \$15,000 on an order for 12-inch cast-iron target-practice shell, which is now in process of manufacture. We expect to place orders obligating funds for target-practice ammunition for the fiscal years 1920 and 1921 in the following amounts: Projectiles, \$497,950; cartridge storage cases, \$157,214; assembling propelling charges, \$133,128; dummy charges for drill purposes, coast defense, \$4,150; miscellaneous targets and other items not yet definitely estimated, approximately \$185,000.

Mr. SLEMP. A total of how much?

Col. PELOT. A total of approximately \$1,015,000.

Mr. SLEMP. In other words, you are going to place orders now for \$15,000 more than you had appropriated last year, which was \$1,000,000.

Col. PELOT. There remained, however, from previous appropriations for target-practice purposes, unobligated, a total of approximately \$1,514,000.

Mr. SLEMP. I understand that, but my point is that you are proposing to place orders between now and the end of the fiscal year to take money out of the Treasury for more than twice the average amount of money that you expended for this purpose in any one year from 1901 to 1918, inclusive, and in addition to that you are asking for \$217,000 more.

Col. PELOT. Yes, sir. I can explain it this way: In the original amount there was estimated this year \$955,386 to cover the cost of major caliber target-practice projectiles for 1921. We find now we

have on hand sufficient funds to procure those projectiles not only for 1920 but also for 1921. Therefore we have reduced our estimate from \$900,000 to \$217,000 to procure with the funds now available the target-practice projectiles for two years, and that explains why the contemplated expenditure is approximately double what it normally would be.

Mr. SLEMP. How much of this appropriation have you spent during this fiscal year?

Col. PELOT. The total disbursements during this fiscal year under K have been \$183,102.12; under K, act of June 15, 1917, \$3,306.18, or a total of \$186,708.30; that is, from July 1, 1919, to December 31, the total disbursements for one-half the year.

Mr. SLEMP. Why not eliminate entirely the \$189,000 you are going to obligate between now and the end of this fiscal year, as it is for uncertain purposes.

Col. PELOT. Because there may be some target-practice material in the way of targets or anchors or tow lines, and one thing or another of that kind for which we have not yet had definite requirements.

Mr. SLEMP. That is not a very commendable way of asking for appropriations from the Treasury for things of that kind which are uncertain and unforeseen when you will expend during the year \$1,000,000.

Col. PELOT. We know definitely what we want for 1921 and we are asking definitely for certain funds for that purpose. If we find we do not need material for which I have stated that we may spend the \$189,000 between now and June 30, the money will not be spent.

Mr. SLEMP. This is for target practice, generally?

Col. PELOT. Target practice in seacoast defenses.

Mr. SLEMP. You could not have done very much target practice during the last year or so in the seacoast defenses. A good portion of your seacoast organization was transferred to France, and I presume you have not done much target practice in the last year.

Col. PELOT. In the last year I do not think there was much target practice, due to demobilization and consequent disorganization. However, during the period of the war, I believe, the guns in the seacoast defenses were used for training purposes by the National Guard troops and the National Army troops that were called into the service. A number of them were stationed in the coast defenses, and I believe quite a little firing was done.

Mr. SLEMP. Have you a large supply of this target-practice ammunition now on hand?

Col. PELOT. We have a certain supply on hand, and what we propose to procure is simply the difference between what we now have on hand and the reserve and allowance for two years.

Mr. SLEMP. Does this involve the ammunition for the railway mounted artillery?

Col. PELOT. It involves some target practice for troops with railway mounts.

Mr. SLEMP. How many rounds do you generally shoot in the seacoast guns in target practice?

Col. PELOT. The allowance of service rounds for 16-inch guns is 17.

Mr. SLEMP. You have not any of those installed, so that ought to be eliminated.

Col. PELOT. One.

Mr. SLEMP. That is not installed.

Col. RICE. Not in this country, but this covers everything.

Mr. SLEMP. Oh, I understand.

Col. PELOT. The allowance per gun for the 16-inch gun is 17 rounds.

Mr. SLEMP. You have that on hand, of course.

Col. PELOT. Yes; and I will insert a statement as to the others.

Target practice ammunition.

Caliber.	Number of guns considered.	Allowance per gun, service rounds.	Total allowance for target practice service rounds.	Subcaliber rounds per gun.
3-inch (15-pounder).....	274	40	10,960	2,000
4-inch.....	4	40	160	450
4.72-inch.....	26	40	1,040	450
5-inch.....	20	16	320	450
6-inch.....	120	16	1,920	450
8-inch.....	15	9	135	300
10-inch.....	102	9	918	300
12-inch.....	131	9	1,179	300
12-inch mortar.....	278	9	¹ 1,251 ² 1,251	35
14-inch.....	24	17	408	300
16-inch.....	14	17	238	300

¹ 700 pounds.

² 1,046 pounds.

NOTE 1.—All allowances shown here are from Special Regulations No. 33.

NOTE 2.—All 4-inch, 4.72-inch, 5-inch guns and 4.7-inch howitzer, model 1913, have been declared obsolete. See second indorsement O.O.400.702/117, dated July 22, 1919.

These allowances are under revision in the office of the Chief of Coast Artillery, but the new allowances have not yet been announced.

Mr. SLEMP. The items you mentioned making up the \$217,000 were for subcaliber ammunition \$127,000, and target material \$90,000, and I take it that both of those items are similar to the \$189,000 item which you mentioned a moment ago.

Col. PELOT. These are definite requirements. The \$127,000 for subcaliber ammunition, Mr. Chairman, is to provide merely for the assembling of the complete rounds and the manufacture of a small amount of powder required. We have the other components on hand. We propose to do the assembling at the arsenal, and in order to be able to do it at the arsenal we will have to have money after June 30, because it can not be completed by that time, and the powder certainly could not be manufactured within that time.

Mr. SLEMP. The same principle would apply to target matériel.

Col. PELOT. The same principle applies to target matériel, because those orders would be given to the arsenal. This entire order, you might say, would be placed with the arsenal.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION, SUBCALIBER GUNS, FOR MOUNTAIN, FIELD, AND SIEGE ARTILLERY PRACTICE (UNITED STATES).

Mr. SLEMP. The next item is:

For purchase, manufacture, and test of ammunition, subcaliber guns, and other accessories for mountain, field, and siege artillery practice, including the machinery necessary for their manufacture.

You are asking in the original estimate for \$105,800, and you have a supplemental estimate of \$100,000, making a total of \$205,800. What is the condition of your balances?

Col. PELOT. On March 5 the Treasury balance under N was \$1,464,082.15, of which the unallotted balance was \$855,064.11, the amount due on contracts and orders was \$609,018.04; under N act, the Treasury balance was \$828,292.39, of which the unallotted balance was \$439,836.66; and the amount due on orders and contracts was \$388,455.73. Under N we expect to turn back to the Treasury on June 30, approximately, \$2,167,000.

Mr. SLEMP. That is included in the statement given by Col. Gatchell yesterday?

Col. PELOT. Yes, sir.

Mr. SLEMP. In the amount that you do not expect to turn back and that you have allotted, is there a certain margin there due to reservations that you might between now and the 1st of July determine to turn back to the Treasury?

Col. PELOT. Possibly some, but very little. The obligations are not large, amounting to only about \$990,000.

Mr. SLEMP. Do you expect to obligate any amounts now for next year's supply?

Col. PELOT. We do not expect to obligate more than about \$17,800, which will be for the manufacture of instruction matériel for the mobile artillery.

Mr. SLEMP. You have such a large quantity of this matériel on hand of all the standard types that I can not understand why you should want to acquire any more.

DETAILS OF ESTIMATE.

Col. PELOT. This estimate does not cover the procurement of any service ammunition of a type we have on hand or service ammunition of any other type. It is divided into two items. The first item is \$105,800 to obtain a supply of 200,000 rounds of one-pounder sub-caliber ammunition for which we have on hand the components, but they are not assembled. This subcaliber ammunition is used for instruction purposes, for preliminary target practice, and is particularly valuable for new troops. The other item of \$100,000 is for targets and target matériel, and not for any item of ammunition.

Mr. SLEMP. Did you not spend a lot of money on targets and target matériel during the war so that you should have a large quantity of that matériel on hand?

Col. PELOT. A great deal of that was makeshift and was made by troops and destroyed in target practice during that period. We estimate that a regiment requires for target practice purposes target matériel amounting to about \$10,979.89. The matériel on hand is such that for 30 regiments, which it is anticipated will hold target practice this year, we estimate there will be required about \$3,000 per regiment to make up the deficit in matériel. The remaining \$10,000 of the \$100,000 is to provide matériel for the field artillery school where a great deal of firing is done for instruction purposes.

Mr. SLEMP. By target matériel you mean just the physical target.

Col. PELOT. Yes, sir.

Mr. SLEMP. These 1-pounder shell are fired by what guns?

Col. PELOT. The \$105,000 covers the 1-pounders which have been planned to be fired from subcaliber tubes in 75-millimeter and 4.7-inch guns and 155-millimeter howitzers.

Mr. OGDEN. And this is based upon an army consisting of how many regiments of field artillery?

Col. PELOT. An army of 21 regiments of field artillery, 8 regiments of Cavalry organized as field artillery, and 1 regiment of field artillery in the Philippine Scouts.

Mr. SLEMP. Does it thrown any light on this subject to remember that you have on hand 277,000 rounds HE shell for the 155-millimeter gun, and for the howitzer of the same type 1,223,000 rounds, and 221,000 rounds of shrapnel already loaded, and of the gas and smoke shell 155-millimeter unloaded 970,000 rounds. Does that help you any?

Col. PELOT. Not for preliminary instruction purposes with new troops, since the ammunition you refer to is costly service ammunition, while our estimate is for small-caliber inexpensive subcaliber ammunition of which the components are on hand.

Mr. SLEMP. In 1918 you had an appropriation of \$1,000,000, and for 1919 you had an appropriation of \$84,600,000, with a deficiency of \$9,000, making a total of \$94,600,000 in three years, and you do not turn back very much under this item. Under this item did you furnish ammunition for training all the field and mobile Artillery troops?

Col. PELOT. Yes, sir.

Mr. SLEMP. And was practically a lot of this money used in procuring ammunition needed by the A. E. F.?

Col. PELOT. Some of the funds, no doubt, were used for the procurement of service ammunition that was not fired.

Mr. SLEMP. Do you know just how much that amounted to?

Col. PELOT. I do not know, sir; we may be able to separate it.

Col. RICE. I may say, Mr. Chairman, that the appropriations C and N, one for procurement of ammunition for service use and the other for target practice, necessarily during the war were used practically interchangeably.

Mr. SLEMP. I was wondering why you could not change back some of this ammunition and use it for target practice.

Col. RICE. We are going to use the ammunition we have on hand.

Col. KING. This is asked for the 37-millimeter subcaliber ammunition. In the 155-millimeter howitzer a gun barrel of 37 millimeters caliber is inserted and then a small shell is fired in it. For instruction purposes we use a number of those in place of the 155-millimeter ammunition on account of economy. It is much cheaper than the 155.

Mr. SLEMP. I call your attention to the fact that you have 223,739 rounds of the 37-millimeter HE and 3,575,934 of the 37 LE.

Col. PELOT. Those guns are not yet inserted in the howitzers.

Mr. SLEMP. But these are shell.

Col. PELOT. But the 37-millimeter gun will be used as a subcaliber gun and not as a service gun, and the 155-millimeter howitzer will probably not be equipped with them by the time they have target practice this summer. There has been given consideration to a project for the insertion of the 37-millimeter gun in the howitzers for subcaliber purposes.

Mr. SLEMP. You did not get my point. You said you were going to use this 37-millimeter ammunition in these howitzers.

Col. KING. That is my understanding.

Mr. SLEMP. And I am calling attention to the enormous supply of this 37-millimeter ammunition you have on hand.

Col. PELOT. There are two types of 37-millimeter guns with different chambers; the ammunition you refer to can not be used in the model 37-millimeter gun that has been put into service as a subcaliber gun, due to having a chamber requiring a type of cartridge case different from that assembled to the large supply of service 37-millimeter ammunition on hand, but identical with the cases we have on hand unassembled and for which we are requesting funds to cover the assembly.

Col. KING. Yes; there are two types of 37-millimeter guns, and he desires now to assemble ammunition that can be inserted in the howitzer. That is an ordnance matter about which I have no knowledge.

Mr. SLEMP. I have given you the supply; why can not you use what you have on hand?

Col. PELOT. Not for the subcaliber guns. We have at the present time ammunition for the 4.7-inch, 155-millimeter gun, and 155-millimeter howitzer; when the 37-millimeter guns that are later to be placed in these howitzers as subcaliber guns are used then we can use probably some of the low-explosive ammunition. The ammunition which we propose to use here is not an ammunition containing explosive in the shell. It is an ammunition that is loaded with sand, and is used for instruction purposes only.

Mr. SLEMP. Are you going to have target practice more now than you had during prewar times?

Col. KING. We hope to, sir.

Mr. SLEMP. You have increased the number of men in the Field Artillery, I presume?

Col. KING. Yes, sir.

Mr. SLEMP. And the number of guns in the Field Artillery?

Col. KING. Yes, sir. The allowance of firing is principally for the training of officers, and we have the allowance based on the number of organizations; and, roughly, I believe it is 400 rounds per organization. That is not the allowance for the schools, but for each battery. We also have a certain allowance for the schools.

Mr. SLEMP. Is not that quite an increase over the allowance you formerly had, say, in 1913 or 1914?

Col. KING. I am inclined to believe it will be. I have not the figures on the old allowance, sir, but I will get them and insert them. My recollection is that that was figured at so many rounds per officer instead of per battery. I find by reference to this report that the present allowance, as compared with the allowance prescribed in 1917, which is a prewar allowance, I think, before we entered the war, is practically double.

Mr. SLEMP. Do you see any military justification for this increased allowance of ammunition?

Col. KING. Yes, sir. All field artillery training is dependent on the observation of fire with service ammunition. Formerly, we did not have enough to properly train our officers and they were not able to observe a sufficient number of rounds of ammunition to be properly

instructed. The office of Chief of Field Artillery has only been organized two years now. Prior to that time, all field artillery officers who had an opportunity constantly recommended increased allowances, and the Chief of Field Artillery, Gen. Snow, has now recommended these allowances, which have received the approval of the Secretary of War as being necessary for the proper instruction of the officer. In other words, the drill of the men can be carried on with dummy explosives, so far as their instruction is concerned, and comparatively little firing is necessary but all the instruction of officers is dependent upon their observation with service fire, and we did not have enough, it was felt, in the training that we were formerly able to give our officers.

Mr. SLEMP. I am simply trying to get at whether or not you have overshot the mark. How do you determine the number of rounds that are necessary for instruction purposes?

Col. KING. It is based on experience with the previous allowances for a number of years, and on that we were obliged to estimate how much more we needed than we were actually giving. We had the benefit also during the war of having a greatly increased allowance, much more than we are now asking for, and we also had an opportunity of training a number of officers comparatively inexperienced, and finding out how much ammunition was necessary to bring them up, and based on those considerations we have made this estimate. There is no rule for arriving at these figures, but a very careful study and estimate was made of that, and that estimate runs about 1,000 rounds per battery per year of the 75s, which practically doubles the last prewar allowance.

Col. PELOT. If we maintain a full war reserve, we have not an ample supply for target practice. However, we are contemplating at the present time the use, of course, of ammunition that we have on hand for target practice purposes, regardless of the war supply.

Col. KING. In reference to the question of maintaining a war reserve, as you understand, ammunition is liable to deterioration, and we have got to keep renewing a certain percentage of that ammunition for the war reserve from year to year. What we are planning to do in regard to target practice is to take the oldest out and use it for target practice.

Mr. SLEMP. Of course, the number of rounds you use per gun diminishes as the caliber increases?

Col. KING. Absolutely; very rapidly.

PANAMA.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION FOR SEACOAST AND LAND DEFENSE CANNON (PANAMA).

Mr. SLEMP. The next item is, "For the purchase, manufacture, and test of ammunition for seacoast and land defense cannon, including the necessary experiments in connection therewith, and the machinery necessary for its manufacture, \$5,751,473." That has been reduced, has it not?

Col. PELOT. That has been reduced to \$2,137,093 for ammunition of seacoast defenses in Panama.

Mr. SLEMP. Give us a statement of your balances there.

Col. PELOT. The Treasury balance on March 5, 1920, under H, Panama, was \$1,586,245.57, of which the unallotted balance was \$152,349.47. The amount due on contracts and orders was \$1,433,896.10. Under H, Panama, act of June 15, 1917, the Treasury balance was \$195,035.32, of which the unallotted balance was \$67,668.42, and the amount due on contracts and orders was \$127,368.90. Of this amount, it is expected that we will be able to return to the Treasury on June 30 approximately \$2,000,000.

Mr. SLEMP. Is that included in the amount referred to by Col. Gatchell?

Col. PELOT. Yes, sir.

Mr. SLEMP. The amount that you have, under orders, contracts, etc., is for material or ammunition?

Col. PELOT. It is for projectiles, principally.

Mr. SLEMP. Do you expect to make contracts, or have you already made contracts for that?

Col. PELOT. Contracts have been made. Before June 30 we want to place orders that will use approximately \$67,750 for the assembling of propelling charges for guns and mortars and for repainting cartridge storage cases.

Mr. SLEMP. What have you spent this year under this item?

Col. PELOT. The total disbursement from July 1 to December 31 was \$187,648, under H, and under the act of June 15, 1917, the disbursement was \$1,511.56. Those disbursements include \$5,820.15 on account of claims, and the remainder principally on current orders for the manufacture of projectiles.

Mr. SLEMP. In what amount did you say you expected to make obligations?

Col. PELOT. Approximately \$67,750.

Mr. SLEMP. Now, then, your request for \$2,137,093 is based upon what details?

DETAILS OF ESTIMATE.

Replacing 12-inch, 14-inch, and 16-inch projectiles-----	\$1, 995, 210
Replacing obsolete cartridges-storage cases-----	99, 112
Replacing old powder charges-----	37, 674
Replacement of fuses-----	45, 097
Total-----	2, 137, 093

Col. PELOT. First, for replacement of armor-piercing shell in sea-coast fortifications, Canal Zone, for 12-inch, 14-inch, and 16-inch guns, and for increasing the present allowance, \$1,995,210; second, for replacement of obsolete cartridge-storage cases and for supplying additional cases for propellant charges required to complete the approved Board of Review project, \$99,112; next, for replacement of old powder charges, \$37,674, and for replacement of fuses, \$45,097.

Mr. SLEMP. Those items are similar to the items which you have estimated in Continental United States, and your line of reasoning in justification of this estimate is the same?

Col. PELOT. It is the same, with this exception, that we contemplate making the replacement on account of obsolete shell and for building up the reserve in Panama all in one year's time, instead of distributing it over a period of five years.

Mr. SLEMP. Have we met the requirements of the Board of Review up to date in regard to Panama?

Mr. SLEMP. Why, then, are you continuing the manufacture of seven thousand seven hundred and eighteen 12-inch shells?

Col. PELOT. Some of those we hope to change to shot. We have been able to make some contracts changing this type over to shot; in other words, a contract calls for shell and we have been able to make an agreement with the contractor where the production has not gone too far changing the uncompleted number to shot.

Mr. SLEMP. What I am driving at is this: Under this item, normally, or before 1917, you had appropriations of \$400,000 with which to provide ammunition of this character for the insular possessions. Since that time you have spent about \$10,000,000 for this purpose, and you have now in the Treasury \$1,000,000 of last year's appropriation, and you expect to obligate \$1,500,000, making \$2,500,000, which is five times what you had in 1916, and five times what you had in 1914 and 1916. Now, in addition to that, you want this other much larger amount of \$3,571,000. I was just wondering if you could not use this \$2,500,000, and deduct that from your estimate. It seems to me that you could from your own statement.

Col. PELOT. In making obligations, particularly during the early war period, or in making allotments and obligations for seacoast ammunition under H, H, Panama, and H, insular possessions, they were not kept straight. There were proportionately greater expenditures under H and H, Panama, than H, insular possessions, and that is why I thought of putting at this time the cost of these 5,000 shot under H, insular possessions. I did that because there is a greater available balance left under that head. I do not mean to say that 5,000 shot would necessarily go to the Philippine Islands or Hawaii, but the expenditure is placed there because of the fact that there are available funds.

Mr. SLEMP. In connection with the other item for the replacement of obsolete cartridge storage cases, does the same line of reasoning that you advanced in the same item for continental United States apply, or is the deterioration greater or less?

Col. PELOT. The probability of deterioration in the insular possessions is greater than in the United States, and the argument made for replacement in the United States holds many times stronger for the Panama Canal and the insular possessions than for the United States.

Mr. SLEMP. Will you insert in the record a statement from commanding officers in the insular possessions showing the practical results from the deterioration of powder in the insular possessions?

NOTE.—This information was furnished by letter.

Mr. SLEMP. In reference to the item for the replacement of old powder charges, does the same line of reasoning apply there as was advanced in the case of the similar item for continental United States.

Col. PELOT. Yes, sir.

Mr. SLEMP. And the line of reasoning in regard to the item for the replacement of fuses is the same?

Col. PELOT. That is the same.

Col. PELOT. I will have to subtract that. We want to obligate to June 30, approximately \$2,569,000, for which we would obtain 5,000 12-inch armor-piercing shot, repaint cartridge storage cases now on hand, and make up the propellant charges for mortars and guns where a shortage now exists in the insular possessions.

Mr. SLEMP. How much does one of those shells cost, of which you want to buy 5,000?

Col. PELOT. About \$500 each. That amounts to \$2,500,000.

Mr. SLEMP. Is not that an excessive amount, considering that you have your board of review project already completed in the insular possessions? Now you are asking for 5,000 new shells. Why should you want 5,000 new shells?

Col. PELOT. These are shot to replace shell.

DETAILS OF ESTIMATES.

Mr. SLEMP. Your item here is for the manufacture of armor-piercing shot to replace obsolete projectiles, \$3,272,360. If you use \$2,500,000 for the purpose for which you are asking this item, you ought to deduct \$2,500,000 from your estimate.

Manufacture of armor-piercing shot to replace obsolete projectiles--	\$3, 272, 360
Replacement of obsolete cartridge storage cases-----	159, 503
Replacement of old powder charges-----	45, 096
Replacement of fuses-----	94, 223

Total-----	3, 571, 182
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Col. PELOT. I might say this: That while the shot will be procured from the funds available under insular possessions, H, and while the insular possessions would be given the first call on the projectiles, yet they would be sent where most necessary. I do not distribute the cost of the 5,000 projectiles among the three different appropriations, but I place them all under the one appropriation. Therefore this does not really represent a true charge against the one appropriation, for the entire number of 5,000 projectiles may not necessarily go to the insular possessions.

Mr. SLEMP. They are all 12-inch.

Col. PELOT. Yes, sir; they are all 12-inch. We have made this estimate with knowledge of the available productive capacity for the 14-inch, 16-inch, and 12-inch shot, and it is intended to place similar orders for 16-inch and 14-inch shot.

Mr. SLEMP. You had on hand on January 1, 1920, 12-inch shot, and you have under manufacture now of 12-inch shot 5,770 round. What will you do with these?

Col. PELOT. The quantity we now have under manufacture is required to make up the board of review project, and they will be distributed wherever the shortage exists.

Mr. SLEMP. You say you have the board of review project completed in the insular possessions. You stand by the board of review project one minute and violate it the next.

Col. PELOT. When I say that the board of review project is completed I mean it is completed with two types of 12-inch projectiles, of which one type is obsolete. That is true not only in the insular possessions, but everywhere else.

Mr. SLEMP. Why, then, are you continuing the manufacture of seven thousand seven hundred and eighteen 12-inch shells?

Col. PELOT. Some of those we hope to change to shot. We have been able to make some contracts changing this type over to shot; in other words, a contract calls for shell and we have been able to make an agreement with the contractor where the production has not gone too far changing the uncompleted number to shot.

Mr. SLEMP. What I am driving at is this: Under this item, normally, or before 1917, you had appropriations of \$400,000 with which to provide ammunition of this character for the insular possessions. Since that time you have spent about \$10,000,000 for this purpose, and you have now in the Treasury \$1,000,000 of last year's appropriation, and you expect to obligate \$1,500,000, making \$2,500,000, which is five times what you had in 1916, and five times what you had in 1914 and 1916. Now, in addition to that, you want this other much larger amount of \$3,571,000. I was just wondering if you could not use this \$2,500,000, and deduct that from your estimate. It seems to me that you could from your own statement.

Col. PELOT. In making obligations, particularly during the early war period, or in making allotments and obligations for seacoast ammunition under H, H, Panama, and H, insular possessions, they were not kept straight. There were proportionately greater expenditures under H and H, Panama, than H, insular possessions, and that is why I thought of putting at this time the cost of these 5,000 shot under H, insular possessions. I did that because there is a greater available balance left under that head. I do not mean to say that 5,000 shot would necessarily go to the Philippine Islands or Hawaii, but the expenditure is placed there because of the fact that there are available funds.

Mr. SLEMP. In connection with the other item for the replacement of obsolete cartridge storage cases, does the same line of reasoning that you advanced in the same item for continental United States apply, or is the deterioration greater or less?

Col. PELOT. The probability of deterioration in the insular possessions is greater than in the United States, and the argument made for replacement in the United States holds many times stronger for the Panama Canal and the insular possessions than for the United States.

Mr. SLEMP. Will you insert in the record a statement from commanding officers in the insular possessions showing the practical results from the deterioration of powder in the insular possessions?

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Mr. SLEMP. In reference to the item for the replacement of old powder charges, does the same line of reasoning apply there as was advanced in the case of the similar item for continental United States.

Col. PELOT. Yes, sir.

Mr. SLEMP. And the line of reasoning in regard to the item for the replacement of fuses is the same?

Col. PELOT. That is the same.

Mr. SLEMP. These are delay action fuses?

Col. PELOT. Yes, sir.

Mr. OGDEN. Are you providing ammunition for 16-inch guns in the insular possessions?

Col. PELOT. There is only one 16-inch gun at the present time, and that is at Panama. That is the only 16-inch gun that we are providing ammunition for.

Mr. OGDEN. You are not providing for 16-inch guns to be emplaced in the insular possessions under this item?

Col. PELOT. No, sir; we are not.

ALTERATION AND MAINTENANCE OF MOBILE ARTILLERY (UNITED STATES).

Mr. SLEMP. Your next item is for the alteration and maintenance of the mobile artillery, including the purchase and manufacture of machinery, tools, and materials necessary for the work, and expenses of the mechanics engaged thereon. Is that the ordinary language?

Lieut. Col. HARMON. Yes, sir.

Mr. SLEMP. You are asking for \$3,893,576, which was subsequently modified to \$3,607,569. You had quite a lot of money last year. Please state your balance on hand at this time.

Lieut. Col. HARMON. The Treasury balance on January 15 under A. of F. L. is \$41,544,924.75. The outstanding allotments against this were \$46,222,883.46; the unallotted balance being a deficit of \$4,677,958.71. Under A. of F. L. act of June 15, the Treasury balance is \$6,528,354.18. The outstanding allotments were \$3,608,288.45. The unallotted balance is \$2,920,065.73. We know that of March 13 there was a free balance of \$13,859,655, and it is probable that there will be available for recovery at the end of the year in the vicinity of \$30,000,000.

Col. RICE. We are now going over, and have been for some time past, all of the outstanding allotments, to get into the free balance everything that we can, without impairing the obligations that we know we have, and there will be for some time to come changes in the balance that will be free, tending to increase that over this that we are giving you now, due to recovery from the various allotments that are outstanding.

CURRENT YEAR EXPENDITURES.

Mr. SLEMP. Have you spent any money under this head this year for the purchase and manufacture of machinery, tools, materials, etc? If so, itemize it.

Lieut. Col. HARMON. The department estimated before Congress last year for \$4,244,751, to be used in the overhaul of a large amount of ordnance material which was acquired during the war, including what was on hand prior to the war. No additional appropriation was made, because of the fact that money was already available, and the Secretary of War authorized the expenditure of that amount to repair the material on hand and to put it in condition for indefinite storage. The allotment of money for this purpose has been made principally to the Rock Island Arsenal, the Savannah prov-

ing grounds, the Erie proving grounds, and to the Aberdeen proving grounds. In addition to that lesser allotments have been made to the field stations at which the artillery and other ordnance material is located, and which have of necessity been employed as temporary storage depots for a considerable quantity of material in excess of that which is in use by the troops at that station.

The money at the arsenals was used almost entirely for labor and material used in the work, and practically none of this has been expended for increased facilities. I just remarked that this money has been used at these arsenals for the hire of labor and mechanics and the purchase of such material as was used in the overhaul of the ordnance, but that very little of it has been expended to purchase increased facilities. Up to the 1st of February we had allotted approximately \$3,000,000 of this money, and it was anticipated that the balance of it will be required to carry out the work being performed during the balance of this fiscal year.

Mr. SLEMP. Describe just what you mean by this work that you are doing.

Lieut. Col. HARMON. Well, at the Rock Island Arsenal there are employed on this work approximately 3,000 men. About half of the force of the arsenal is employed on this work during the fiscal year. The material being shipped back from France is in very poor condition on account of its use in the field and on account of damage it sustained in transportation across the ocean and also due to exposure while passing through port storage depots, etc., and upon arrival at the arsenal the material is completely overhauled and put in as nearly first-class condition as is practicable.

We are limited in that by the necessity for getting all of the material into storage this fiscal year in such condition that it will not deteriorate; that is to say, our first object is to prevent further deterioration of the materials, and our second object is to put it in first-class condition. The work actually performed on a gun carriage, for instance, at the arsenal is that the carriage is, where necessary, scraped and repainted, and the recuperator is overhauled, and the recuperator constitutes the most expensive part of the work. The hydropneumatic recuperators which we are using on the field artillery matériel are somewhat perishable on account of the construction of the inner surface of the bore on the cylinder, and the recuperator cylinder, and those which were in service are all more or less damaged, and have to be repolished before going into storage, to prevent further deterioration.

Mr. SLEMP. What per cent of the artillery you have on hand has seen service? Take, for example the six thousand 75-millimeter guns.

Lieut. Col. HARMON. The majority of those which were manufactured in the United States did not see service, but most of those which were purchased in Europe were in action.

Mr. SLEMP. Do you know how many there were of those?

Lieut. Col. HARMON. I do not know off-hand; I can put that in the record.

Artillery matériel procured abroad.

Matériel.	Procured abroad prior to Nov. 11, 1918.	Procured abroad subsequent to Nov. 11, 1918.
58-mm. trench mortars.....	136	.....
3-inch trench mortars.....	854	.....
6-inch Newton mortars.....	413	.....
150-mm. Fabry mortars (French).....	13	.....
240-mm. trench mortars (French).....	101	.....
75-mm. antiaircraft guns.....	66	.....
75-mm. guns, model 1897.....	1,862	944
60-pounder guns.....		200
6-inch guns Mark XIX (British).....		100
6-inch gun bodies, Mark XIX (British).....		50
155-mm. guns.....	233	198
155-mm. howitzers.....	796	700
8-inch howitzers.....	120	148
9.2-inch howitzers.....	40	.....

Mr. SLEMP. I wish you would.

Mr. BYRNS. You have a considerable amount in storage.

Lieut. Col. HARMON. Yes, sir.

Mr. BYRNS. Now, is it proposed, in reference to them, just to alter those and put them in good condition, or just to put them in such condition that they will not further deteriorate?

Lieut. Col. HARMON. If there is anything seriously wrong with them they will be repaired.

Mr. BYRNS. Whether you anticipate early use or not?

Lieut. Col. HARMON. Oh, yes.

Mr. SLEMP. Having a surplus of that particular gun, for instance, why should you go to any expense on those you have in storage?

Lieut. Col. HARMON. Well, the question of a surplus seems to me to depend more or less on an assumption of the conditions.

Col. RICE. There is no surplus, Mr. Chairman; not on the requirement schedule that we have now.

When I speak of surplus, I speak of surplus for war demands. We have a surplus for peace times; a large surplus; but speaking of war, we have no surplus.

Mr. BYRNS. This thought was in my mind: If you had any particularly large surplus and any considerable portion of it was in the condition as described by the colonel—in other words, if through service or transportation here it was in such condition that it needed considerable repair, if it were going to be stored and probably stored for a number of years, we might find ourselves in the position of having a lot of obsolete guns when they were needed, and all the money that had been used by putting them in repair would have been wasted. You are merely improving the types.

Col. RICE. Yes; that would be true if it was surplus on a war program; that is not true. But we are disposing of things that are not needed in the war program.

Mr. SLEMP. Right there, I was told by some one in the department that this was surplus for the requirements of a million and a half men. Now, how near through this work are you?

Lieut. Col. HARMON. We are about three-fourths through with it. I have a table here of the principal items which are yet to be completed.

Mr. SLEMP. I would like to hear that.

Lieut. Col. HARMON. Seventy-five-millimeter guns and carriages, model of 1897, of French manufacture, 120; 75-millimeter guns and carriages, model 1917—this is the British type—118; 4.7 guns and carriages, model of 1906, 325; 155-millimeter howitzers and carriages, 1,662; 155-millimeter guns and carriages, 68; 6-inch guns and carriages, Mark XIX, 150; 8-inch howitzers and carriages, 261; 240-millimeter howitzers, 282; 3-ton antiaircraft trailers, 441; artillery repair trucks, 884; artillery supply trucks, 2,059; light repair trucks, 15; 5-ton tractors, 1,459; 10-ton tractors, 1,649; 3-inch field-gun trailers, 1,355; 3-inch field guns, 1,032; machine guns, anti-aircraft trailers, 838; heavy mobile ordnance repair-shop trucks, 163; heavy mobile ordnance repair trailers, 155; 3-inch guns and carriages, model 1902, 414; 37-millimeter guns and carriages, 432.

Mr. SLEMP. In putting your total in will you put in any amount you expect to expend on each item, and where the work is to be done—what particular arsenal?

Lieut. Col. HARMON. Yes, sir.

Work remaining to be done in overhaul of field artillery matériel after Mar. 1, 1920.

Kind.	Quantity remaining to be overhauled.	Unit cost.	Total cost.
75-mm. guns and carriages, model of 1897 (French).....	120	\$550	\$66,000
75-mm. guns and carriages, model of 1917 (British).....	118	250	29,500
4.7-inch guns and carriages, model of 1906.....	325	250	81,250
155-mm. howitzers and carriages.....	1,662	410	681,420
155-mm. guns and carriages.....	68	410	27,880
6-inch gun and carriages, Mark XIX.....	150	350	52,500
8-inch howitzers and carriages.....	261	350	91,350
240-mm. howitzers.....	282	410	115,620
3-ton antiaircraft trailers.....	441	150	66,150
Artillery repair trucks.....	884	100	88,400
Artillery supply trucks.....	2,059	100	205,900
Light repair trucks.....	15	75	1,125
5-ton tractors.....	1,459	225	328,275
10-ton tractors.....	1,649	225	371,025
3-inch field gun trailer.....	255	150	38,250
10-ton trailer.....	32	150	4,800
Machine gun antiaircraft trailers.....	838	150	125,700
6-ton Ford tanks.....	114	225	25,650
H. M. O. R. S. trucks.....	163	150	24,450
H. M. O. R. S. trailers.....	155	150	23,250
3-inch guns and carriages, model of 1902.....	414	50	20,750
37-mm. guns and carriages.....	342	25	8,550
Grand total.....			2,477,795

About \$1,000,000 of this had been allotted Feb. 1, requiring additional allotments of about \$1,477,795.

Mr. SLEMP. Now, as to the estimate that you are making for the coming year; is that the estimate of the amount required to complete this work?

Lieut. Col. HARMON. No, sir; we expect—we hope to complete the original overhaul by the end of this fiscal year of material going into storage.

Mr. SLEMP. That is, you will know just what is to be done with all of the pieces overhauled?

Lieut. Col. HARMON. Yes; that is, we expect to have all of the material at the end of this year in such condition that it can be left in storage indefinitely. By "indefinitely" I do not mean without

any further attention whatever, as there will always be an expense in connection with it; and that expense is what is involved in the estimate for the coming year.

Mr. SLEMP. What alterations that you expect to make in this artillery while overhauling will be made and completed during this fiscal year?

Lieut. Col. HARMON. No. The material will be in such condition that it will not further deteriorate if put into storage, but not all of it will have to be put in first-class condition; to that we are giving such attention as we possibly can.

Mr. SLEMP. To what extent will you have that feature of the work completed by June 30?

Lieut. Col. HARMON. It will be complete, I think, on the important items of material, but will not be entirely complete on such mounts as the 4.7 and some of the 75-millimeter.

DETAILS OF ESTIMATES.

Mr. SLEMP. Now, taking the estimate of three millions and odd, please explain that.

Details of the estimate.

Maintenance of—

Serviceable artillery material (exclusive of tractors) in storage-----	\$1,612,695
Serviceable artillery material (exclusive of tracts) in the hands of troops-----	1,003,627
Artillery material of obsolete design-----	13,247
Tractors in the hands of troops-----	600,000
Tractors in storage-----	378,000
Total-----	3,607,569

Lieut. Col. HARMON. It is divided into headings as follows: For serviceable artillery material, exclusive of tractors in storage, \$1,612,695; the next item being serviceable mobile artillery material, except tractors, in the hands of troops and otherwise in service, \$1,003,627; for artillery material of obsolete design which will eventually be disposed of but which is at present a care under maintenance, \$13,247; for tractors in the hands of troops, \$600,000; for tractors in storage, \$378,000. The value of the material which is going into storage is \$312,078,547; and we are estimating for a maintenance of that material one-half of 1 per cent of its value.

Mr. SLEMP. Why do you do that; you lock it up in storage and do not see it any more?

Lieut. Col. HARMON. Experience in previous years has led us to estimate for 1 per cent of the value of the material for its preservation, and the amount we are asking for here is only one-half of that. The artillery requires attention occasionally to see that the interior of the recuperators does not corrode; we try to prevent corrosion by filling the cylinders full of oil, but we find by experience that when a cylinder has stood for several months and is opened up there is a void space in there that is not occupied by oil, and that corrosion has begun. Also, there is more or less deterioration in the packing and washers which are used. In this type of gun there are washers made

of rubber and leather and dermatine, all of which are subject to deterioration at different rates; so that it is necessary to handle all of this material. You might say that the handling charge is quite an important item.

Mr. SLEMP. Do you mean that you have to go over every one of those guns and recuperators to any great extent every year when they are not being used, but locked up away from the weather and away from any touch?

Lieut. Col. HARMON. We have not had any experience with this type of mount in storage, as we have never had any of them before the war—the hydrodynamic type—and what we intend to do is to examine certain samples every month—tear them down, and see what is happening to them—and based on the discovery that is made there we will take action on the remaining carriages.

Mr. SLEMP. I do not see why it follows that maintenance should have any relation to value exactly. You take two guns, and one happens to have a tremendous amount of steel in it and the other has not, and yet the smaller priced guns might have a more difficult mechanism to preserve than the other type; and yet because the first type costs, say, ten times as much, you would argue that it would require that much more to maintain it. That might apply if you had to repaint the guns every year, but you are not supposed to have to do that, are you?

Lieut. Col. HARMON. No, sir; we merely have to scrape it where the paint is coming off, or where it is rusting under the paint and paint locally. The one reason that we use a percentage basis is that we have no previous experience on which we can make any other kind of estimate. The estimates for this purpose in the past have been made on the percentage basis.

Mr. SLEMP. But a large per cent of those guns which you made that estimate on before were actually used, weren't they?

Lieut. Col. HARMON. Yes, sir.

Mr. SLEMP. And you have had no experience with guns in sheds and not touched?

Lieut. Col. HARMON. Yes; we have some experience, and the previous estimates for such maintenance was 1 per cent of their value; but it has never been considered sufficient.

Mr. SLEMP. What is the percentage estimate for guns actually in service not in war, but in peace times?

Lieut. Col. HARMON. For guns in service we are estimating 3 per cent.

Mr. SLEMP. Three per cent?

Lieut. Col. HARMON. Yes; in past years the estimate has been 2.7 per cent, but it has been entirely insufficient, and in view of the very greatly increased cost we have increased that.

Mr. SLEMP. I can see some justification for that, but the other I do not; I do not presume to be an expert, but it does not sound very logical.

Lieut. Col. HARMON. Well, one-half of 1 per cent is a very small amount.

Mr. SLEMP. How much does it amount to, in your estimate?

Lieut. Col. HARMON. In total it amounts to \$1,612,695, and this is for the preservation of over \$312,000,000 worth of equipment.

Mr. SLEMP. Now, let us go with the explanation of the other items there.

MOBILE-ARTILLERY MATERIAL (EXCEPT TRACTORS).

Lieut. Col. HARMON. The next item, which was for serviceable mobile-artillery material, except tractors, in the hands of troops, \$1,003,627; the value of the material in the hands of troops is \$33,454,258, and due to the wear and tear on this material while it is being used in drill and for target practice, etc., the cost of maintenance is very large, higher than for that material in storage. And, also, we have the fact that the repairs to this material are being made at the stations where the troops are located, and the cost of operations is slightly higher than at an arsenal, and, therefore, we have provided 3 per cent of the value of the material.

Mr. SLEMP. And that is higher than your ordinary experience justified?

Lieut. Col. HARMON. Yes; that is higher than our past practice.

Mr. SLEMP. And it is doubled up, also, for the further reason that the cost of those things has doubled?

Lieut. Col. HARMON. Yes; that is true.

Mr. SLEMP. And you could not get such work done now for a given amount of money?

Col. RICE. That is based on the price we paid for them in the war, which is less than it would be now.

Mr. EAGAN. Is that work done by men in the service or by civilian men.

Lieut. Col. HARMON. Civilians.

Mr. SLEMP. Those are the two items?

OBSOLETE ARTILLERY MATERIAL.

Lieut. Col. HARMON. There are more items here. The next item was for artillery material of obsolete design which will eventually be disposed of, \$13,247. I have here a list of guns, howitzers, limbers, caissons, etc., which have been declared obsolete but the disposition of which has not yet been indicated; that is, these types of materials will not be issued to troops, but no steps have been taken to dispose of them.

Mr. SLEMP. Are you going to spend any money on them?

Lieut. Col. HARMON. A small amount; one-fourth of 1 per cent of their value.

Mr. SLEMP. Does this appropriation take care of the storage of this field artillery?

Lieut. Col. HARMON. There is an additional storage charge under the appropriation, "Ordnance stores and supplies," but this covers by far the greater part of it; that is very small in comparison with this.

Mr. SLEMP. Take a gun that lands at Hoboken and trace just what you would do with it in the different appropriations that are available for it.

Lieut. Col. HARMON. Well, when it is landed at Hoboken it is re-shipped to some arsenal, such as Rock Island Arsenal. The transportation is not paid from any of these appropriations. The cost is

borne by the Quartermaster's Department, and upon arrival at the arsenal the gun is received, and the handling from that point until it is ready to go into the storehouse is charged entirely to this appropriation. The actual placing of it in the storehouse will not be charged to this, nor would the issue of the gun be charged to this appropriation when it comes time to take it out of the storehouse and reissue it to troops; the cost would be charged to a different appropriation.

Mr. SLEMP. Colonel, did you estimate for an entirely new gun which is received from manufacture and stored away and no use whatever of it? Would that require one-half of 1 per cent of its value to keep it from going to pieces or to maintain it?

Lieut. Col. HARMON. No, sir; that would require slightly less than that, but the saving on that gun would be applied to a gun in worse condition. We have found out that the painting which was done during the war was of a very low quality, and the paint is deteriorating so rapidly that nearly all of the material is having to be repainted, or will have to be within the next year or two.

Mr. SLEMP. Now, discussing this appropriation last year—that is, appropriation “L,” Mr. Good said:

It is altogether likely you will not need any money for maintenance next year?

Gen. WILLIAMS. That is true, if we succeed in canceling a sufficient amount.

The meaning of that last part is not very clear.

Lieut. Col. HARMON. Doesn't that mean that he expects sufficient money to be available to cover the requirements for next year?

Mr. SLEMP. Does this take care of these caissons and gun carriages, trailers, and all?

Lieut. Col. HARMON. Yes, sir.

Mr. SLEMP. You haven't really got enough covering for the gun carriages and trailers, have you?

Lieut. Col. HARMON. No, sir; we have not.

Mr. SLEMP. What are you doing about that?

Lieut. Col. HARMON. We expect to dispose of a considerable number of the limbers and caissons.

TRACTORS IN THE HANDS OF TROOPS.

The next item is for tractors in the hands of troops, \$600,000.

Mr. SLEMP. What kind of tractors are those?

Lieut. Col. HARMON. Five-ton and 10-ton. They are——

Mr. SLEMP (interposing). You would not want that much money for tractors, would you?

Lieut. Col. HARMON. Well, there are 2,000 five-ton tractors in use by the service.

Mr. SLEMP. What did each one of them cost?

Lieut. Col. HARMON. The unit cost of a 5-ton tractor is \$4,600, and we are allowing a cost of \$200 each for their maintenance.

Mr. SLEMP. Four hundred thousand dollars?

Lieut. Col. HARMON. Four hundred thousand dollars; yes, sir. The wear and tear on a tractor is very large—greater than on any other item of artillery equipment. That is why we have to handle them as a separate item here—particularly in a sandy country,

where the sand gets into the bearings and wears them out rapidly. A tractor, of course, has a gasoline engine in it, which requires a great deal of attention to keep it in running order.

Mr. SLEMP. Will these 2,000 tractors be actively in use in the Army? What guns do they carry?

Lieut. Col. HARMON. They carry the 155-millimeter howitzer, and they will be used to a certain extent to carry the 75-millimeter, as Col. Moody explained yesterday.

Mr. SLEMP. Now, you need how many of those tractors per gun?

Lieut. Col. HARMON. Only one tractor.

Mr. SLEMP. You have in active service how many 155-millimeter howitzers?

Lieut. Col. HARMON. It is pretty hard for us to tell just how active the use of the guns is which we have issued to the service. We have issued to the service 158 of the 155-millimeter howitzers—to the troops of the Regular Army.

Mr. SLEMP. You are going to use those 5-ton tractors to what extent in your motorization?

Lieut. Col. HARMON. Only to the extent which will be determined by the Chief of the Field Artillery.

Mr. SLEMP. Four regiments, how many guns would that be?

Lieut. Col. HARMON. Ninety-six. I think they allow 77-tractors to a regiment.

Mr. SLEMP. That gives you a total of 596 tractors, even if you motorize all four regiments, which you are not expecting to do, with the 5-ton tractors. Instead of the 2,000 tractors which you say you are going to use, you would only have a maximum of 596 in service.

Lieut. Col. HARMON. These tractors are actually out now and presumably in use, and Col. Moody expects that the greater part of the balance of the 2,000 will be in service before the end of this year. As a matter of fact, they are used for other purposes than motorizing the artillery.

Mr. SLEMP. It seems to me that you have not justified in a definite way the use of 2,000 tractors.

Lieut. Col. HARMON. I am afraid I can not do that, sir.

Mr. SLEMP. Unless it is just ordinary hauling purposes around the camps.

Lieut. Col. HARMON. They are used to a certain extent for utilities; that is, in pulling trucks which are assigned to the artillery out to their places, and in certain cases as substitutes for the trucks, where they are more usable.

Mr. SLEMP. You ask how much for the 5 tons?

Lieut. Col. HARMON. \$400,000.

Mr. SLEMP. And the balance——

Lieut. Col. HARMON (interposing). For the 10-ton truck, as we expect that there will be only a few of them in service; we are allowing the same for the 10-ton, but there will be less of them used.

Mr. SLEMP. Where is the 10-ton placed in your service?

Lieut. Col. HARMON. The 10-ton is used for pulling the 155-millimeter Tilloux gun, and the 8-inch howitzer.

Mr. SLEMP. How many of those do you have in service now?

Lieut. Col. HARMON. Of the 8-inch howitzers, there are now in service with the Regular Army 81; of the 155-millimeter field gun, 84. The 9.2 are not in service at the present time.

Mr. SLEMP. That would be 165, instead of 1,000?

Lieut. Col. HARMON. Yes, sir; and in addition to those there are 8-inch howitzers in service with schools, and of the 155-millimeter field gun also in service with schools.

Mr. SLEMP. A total of how many?

Lieut. Col. HARMON. One hundred and eighty-two.

Mr. SLEMP. A total of 182, and you certainly would not want 1,000 10-ton tractors for the use of those 182 guns, particularly in peace times?

Lieut. Col. HARMON. The information that we have——

Mr. SLEMP (interposing). I mean, there must be some other utility that you have in mind than just the hauling of those guns.

Lieut. Col. HARMON. Yes; but not in any great quantity. They are used as utilities in various stations; the tractors are scattered around in these camps, and they are made use of at the points where they are presumably in storage.

TRACTORS IN STORAGE.

The next item is for tractors in storage, \$327,000.

Mr. SLEMP. How many have you in storage?

Lieut. Col. HARMON. Two hundred and twenty-five of the 5-ton, and of the 10-ton, 400.

Mr. SLEMP. It costs, evidently, as much to keep a tractor in storage as it does for a tractor running all the time, according to these figures.

Lieut. Col. HARMON. Yes; that is pretty nearly the fact.

Mr. SLEMP. That could not be, of course. There is no difference, so far as I can understand in a tractor and an automobile, so far as general principles are concerned.

Lieut. Col. HARMON. No; not in storage, but it is necessary to take the tractors out occasionally, in order to keep the engines from deteriorating. The engine cylinders, like the cylinders in the recuperators, have to be attended to frequently, in order to prevent them from rusting up and becoming useless. One of the reasons why our cost of maintenance for equipment in storage—one of the reasons that those costs are high is that our storage space is so limited, and all the conditions under which the equipment is stored makes it extremely difficult to get at it in order to take care of it. The warehouses are of very large dimensions, and it is necessary to move practically all of the tractors out in order to get at those which are in the interior portion of the storehouses.

Mr. SLEMP. I don't think you can justify an expenditure of \$300,000 for the care of 3,800 tractors. Let us see what those 3,800 tractors would cost as an original proposition.

Lieut. Col. HARMON. They would cost \$18,920,000.

Mr. SLEMP. Now, on what per cent have you figured?

Lieut. Col. HARMON. We figured on 2 per cent, sir.

Mr. SLEMP. One-half of 1 per cent is the rate for storage?

Lieut. Col. HARMON. On the artillery material, yes; but we figured 2 per cent on the tractors.

Mr. SLEMP. That estimate here is not based on any experience at all, is it?

Lieut. Col. HARMON. No, sir; it is not.

Mr. SLEMP. I believe it ought to be revised. Now let us take the next item.

Lieut. Col. HARMON. That is the last item of that.

Mr. SLEMP. Have you anything else to say on that, Colonel?

Lieut. Col. HARMON. No, sir.

Mr. OGDEN. Let me ask you, Would the insufficient storage facilities for those tractors account for the high percentage of maintenance?

Lieut. Col. HARMON. It is a factor in the high percentage; yes, sir.

Mr. OGDEN. Are not the facilities sufficient for the tractors that you have on hand?

Lieut. Col. HARMON. At many of the stations the tractors are being stored in vacant horse sheds, and so forth, which are usually open on one, and in many cases, on all four sides. That exposes them more or less to the weather, and even if they are covered with tarpaulins there is considerable deterioration. At the storage depots most of them are under cover.

Mr. SLEMP. It seems to me that that is the first thing you ought to look after, and save your 2 per cent that way.

Lieut. Col. HARMON. I think every effort has been made to secure as much covered storage space as possible.

Mr. SLEMP. Let us take the next item, then.

Col. RICE. On the same page, M.

ALTERATION AND MAINTENANCE OF SEACOAST ARTILLERY (UNITED STATES).

Mr. SLEMP. Now, you have the same or similar items in relation to seacoast artillery, for which you asked \$3,013,427, which has been reduced to \$1,197,081. Give us the state of your balances and what you have done with the money this year, etc.

Lieut. Col. HARMON. The Treasury balance under "M" on January 15 was \$228,520.50; the Treasury balance under the act was \$168,667.49; and under "M," 1919-20, \$1,236,970.26. The outstanding allotments against "M" were \$138,020.12; against the act, \$119,477.85; against "M," 1919-20, \$933,339.32. The unallotted balance under "M," \$90,500.38; under the act, \$49,189.64; under "M," 1919-20, \$303,630.94; a total of \$480,023.29. That is for the continental United States only, the statement which I have given you.

Mr. SLEMP. What alterations are you making this year in your seacoast artillery?

Lieut. Col. HARMON. There was previously a rather extensive program for alterations on the coast artillery and money was appropriated last year for carrying it out, but due to the press of work, and due to the determination that it was not perhaps altogether desirable to spend a great deal of money in major alterations on material, not very much has been done in that connection.

Mr. SLEMP. You have spent, according to your own statement, \$950,000 out of the \$2,255,000 that you received; you have only \$1,305,000 left?

Lieut. Col. HARMON. Yes; but the majority of it has not been spent on alterations; it has been spent on maintenance.

Mr. SLEMP. That is from two to three times as much as you have had for alterations and maintenance both heretofore, even for 1917.

Lieut. Col. HARMON. Well, one of the reasons that the maintenance items has increased is the fact that the amount of material which we have to maintain has increased very materially since the war. I have a statement here showing the value of the material as it—

Mr. SLEMP (interposing). I would rather you would have the amount, rather than the value. You have not added any more guns to your seacoast defenses; as a matter of fact, you took away 276 guns to France, and they have not been returned to the seacoast defense; and your 12-inch guns—the number of them added during the year to the seacoast defenses is just five or six at the most, so it can not be on the quantity.

Lieut. Col. HARMON. This item, perhaps I should state, covers railway artillery as well as strictly seacoast artillery. The total cost of the armament in the continental United States, insular possessions, and the Panama Canal Zone for the fiscal year 1920 was \$61,144,643, divided as follows: For the continental United States, \$51,293,981; for the insular possessions, \$6,056,586; and in the Panama Canal Zone, \$3,794,076.

Mr. SLEMP. Now, what does that have to do with the alterations or maintenance; there might have been 10 times that value and still no charge for alterations or maintenance?

Lieut. Col. HARMON. Well, the statement, as I have given it, is not yet complete. Since the above estimate was made there have been added a number of guns and carriages; there are a number of guns and carriages which are considered of an obsolete type which will cause a reduction in that figure, and the total value of this armament is estimated at \$2,893,752, which being deducted from the total amount leaves a balance of \$58,250,891. Now, since the estimate there have been added the following armament, which has either been completed or is in process of manufacture and will become a care under maintenance during the fiscal year 1921: Thirty-six 10-inch sliding railway mounts at a value of \$110,000 each; the value of gun or mortar is \$40,000 each, or a total of \$5,400,000; six 14-inch Navy mounts, at \$175,000 each, with the value of the gun and mortar at \$150,000 each, or a total of \$1,950,000; one 12-inch howitzer, 20-caliber, \$125,000, and the value of the howitzer, \$50,000, or a total of \$175,000. This has increased the previous value of the material by \$7,525,000.

There are now under construction at Watertown Arsenal twelve 16-inch barbette carriages, models of 1919, and it is estimated that 25 per cent of those will become a care under maintenance for the fiscal year 1921; twelve 16-inch barbette carriages, model of 1919, value of gun, \$250,000; value of carriage, \$300,000, or a total of \$6,600,000. In addition to the above, 26 guns and carriages, also 10-inch guns and carriages, originally intended to be scrapped, are being remounted and will become a care under maintenance; 26 D. C. guns and carriages at value of \$414,756; thirty-seven 10-inch D. C., model 824-918 value of carriage, \$25,000; value of gun, \$31,725, or a total of \$2,098,825; making a total of \$2,513,585 to be added. The summary of this is that the new armament as tabulated and charged to continental United States, \$7,525,000; the value of material as estimated for 1920, less

that material which is to be scrapped, \$58,250,891. The armament as tabulated which was to be scrapped, but which is being retained in service, \$2,513,585; 25 per cent of the value of twelve 16-inch barbette carriages now under construction, \$1,650,000, a total of \$69,939,476. That is divided among the continental United States, insular possessions, and Panama Canal, as follows: Continental United States, \$60,296,793; insular possessions, \$5,848,661; Panama Canal, \$3,794,076.

DETAILS OF ESTIMATE.

Two hundred and fifty-seven 3-inch guns on barbette carriage; 2 16-inch Howitzers on railway mounts; 1 14-inch gun on railway mounts; 15 12-inch guns on railway mounts; 47 8-inch guns on railway mounts; 21 7-inch guns (Navy) on railway mounts; 91 12-inch mortars on railway mounts; 138 3-inch guns on anti-aircraft mounts.

A detailed estimate for the alteration, repair, and maintenance of seacoast artillery follows:

Repair and maintenance of seacoast artillery (about one-half of 1 per cent of the total value of the armament)-----	\$361,780.00
Spare parts for guns-----	64,000.00
Spare parts for carriages-----	192,000.00
Cleaning and preserving material, except for fire-control instruments-----	161,600.00
Minor alterations to carriages-----	12,000.00
Relining guns and replacement of subcaliber guns-----	212,320.00
Repairs and maintenance, spare parts and cleaning and preserving material for fire-control instruments-----	93,380.80
Total-----	1,097,080.80
Major alteration to carriages (see item No. 8, notes on estimates)-----	100,000.00

Under the estimate for the United States, for instance, which is \$1,197,080.08, we have the following items: Repairing and maintenance of sea coast artillery at one-half of 1 per cent of the total value of the armament, \$361,780; the value is used as a basis for that estimate. And the second item, spare parts for guns, \$64,000; third, spare parts for carriages, \$192,000; fourth, cleaning and preserving material, except for fire-control instruments, \$161,600; fifth, minor alterations to carriages, \$12,000; sixth, relining guns and replacement of subcaliber guns, \$212,320; seventh, repairs and maintenance, spare parts and cleaning, and preserving material for fire-control instruments, \$93,380; eighth, major alterations, \$100,000.

Mr. SLEMP. Now, Colonel, have you always based your estimates on alterations and maintenance on one-half of 1 per cent of the value; I mean in this item? Take, for example, 1915: You asked for only \$300,000, and Congress gave you \$300,000. Do I understand that for 1921, for which you are asking for \$1,000,000, the value of the same ordnance will have gone up, say, 3½ times its former value, and therefore the maintenance of this same ordnance, which is probably 95 per cent the same, should therefore go to a million and some odd dollars?

Col. HARMON. It is my opinion that the percentage has always been that.

Mr. SLEMP. Then point out the logic of your position.

Col. HARMON. That the increased estimate is due to the increase in the value of the material.

Mr. SLEMP. Do you employ any more men than you did before?

Col. HARMON. Oh, yes; we have all the railway artillery in addition to the sea-coast artillery to maintain. The total value is very much greater and the amount required for preservation is greater in proportion to the value.

Col. RICE. At the time you are speaking of, Mr. Slemph, the estimated value of the seacoast armament was in the neighborhood of \$36,000,000, so that \$3,000,000 is somewhere near 1 per cent. Of course, the cost of that same amount of material is not due to the increased cost alone, but the material and labor would be twice that on the same basis, and the cost for assembling it.

Mr. SLEMP. Have you changed the valuation of the guns in your plant any, the guns that you valued in 1915 at a certain sum?

Col. HARMON. No, sir.

Mr. SLEMP. Are you sure of that?

Col. HARMON. The values that we use represent the contract price of the matériel—the price is actually paid for it. The price is not changed to make it in accordance with present-day costs.

Mr. SLEMP. Have you added between 1915 and 1920, \$30,000,000 worth of guns to our seacoast defenses?

Col. HARMON. I have not the value here in 1915, but the present value is approximately \$70,000,000.

SPARE PARTS FOR GUNS AND CARRIAGES.

Mr. SLEMP. Take up the other items, spare parts for guns and spare parts for carriages.

Col. HARMON. Spare parts for guns, \$64,000. The estimated cost for spare parts is about 20 per cent less than what we asked for in the year 1920.

Mr. SLEMP. What about the carriages? Are the carriages the same?

Col. HARMON. Yes, sir; the direction is just the same.

CLEANING AND PRESERVING MATERIAL.

Mr. SLEMP. You have an item for cleaning and preserving material. What material is that?

Col. HARMON. That is oils, greases, paints, etc.

Mr. SLEMP. You surely would not want \$161,000 for that purpose?

Col. HARMON. Even that is less than the last estimate.

Mr. SLEMP. I know, but that is not any argument that would justify this. What is the matériel that you clean and preserve?

Col. HARMON. The guns and the carriages.

Mr. SLEMP. Why should not that come under your one-half of 1 per cent or your 1 per cent, and therefore be included in your \$361,000 item?

Col. HARMON. That is supposed to cover repairs which are done by mechanics, but this is for material which is used in the work.

MINOR ALTERATIONS AND ALTERATIONS TO BREECHBLOCKS:

Mr. SLEMP. The next item is for minor alterations and alterations to breechblocks. Do all the breechblocks have to be changed?

Col. HARMON. No. It is only incidental alterations that become necessary.

Mr. SLEMP. There is just \$12,000 asked for in that connection. That is for minor alterations of carriages. The other item, \$212,000, is quite an item.

Col. HARMON. That is for relining guns and replacement of sub-caliber guns.

REPAIR OF FIRE-CONTROL INSTRUMENTS.

Mr. SLEMP. For repair of fire-control instruments you ask \$93,000.

Col. HARMON. That is based on the value of the equipment.

EMPLOYMENT OF TRACTORS.

Mr. OGDEN. I wish to ask a question on the tractor proposition. What is the number of tractors that may be considered surplus in peace time? You gave it a moment ago, I believe.

Col. HARMON. According to the plans that they are working on, they do not consider that any of the tractors will be surplus, even for peace-time requirements.

Mr. OGDEN. Well, instead of paying the high cost of maintenance of these tractors, it seems to me it would be advisable for the Government to put these tractors out among the States for service on the Federal aid of roads, would it not?

Col. HARMON. Except that they expect to use them all.

Mr. OGDEN. They could be used to good advantage on the Federal aid of roads, it seems to me.

Col. RICE. I should like to put a statement in the hearing on that rather than try to discuss it here. We have the exact use to which all those tractors will be put in tabulated form. Will that be satisfactory?

Mr. OGDEN. Yes, sir.

statement regarding uses for which tractors have been retained by the War Department.

1. All commercial type tractors, totaling about 1,000, have been sold or turned over to the Department of Agriculture.

2. Six thousand eight hundred and fifty standard type tractors are on hand.

Requirements.

Equipment Corps of Engineers.....	550
Vocational training:	
Agriculture.....	200
Motor vehicle.....	216
Ordnance tractor schools.....	120
Equipment intermediate mobile armament of seacoast defenses.....	348
Transport service.....	200
Reserve officers' training camps.....	140
Artillery:	
16 National Guard divisions with proper complement of corps and Army artillery.....	7,357
16 Regular Army divisions with proper complement corps and Army artillery.....	5,136
Total	14,267

3. On account of details of organization of the peace Army being dependent on pending legislation, considerable variation from the above schedule is to be

expected, but it is apparent that under any scheme that may be adopted that all tractors on hand will be required. The above is based on an Army of the size proposed by the bill that recently passed the House of Representatives.

ALTERATION AND MAINTENANCE OF SEACOAST ARTILLERY IN INSULAR POSSESSIONS.

Mr. SLEMP. You ask for \$159,548.40 for fortifications in insular possessions; that is, you have reduced your original estimate from \$628,664 to the amount I have stated.

Col. HARMON. Yes.

Mr. SLEMP. Will you give us the state of your balance?

Col. HARMON. Fortifications, insular possessions, M. The Treasury balance as of January 15 is \$67,190.07. The outstanding allotments against that are \$27,841.35. The unallotted balance is \$39,348.72. Under the act the Treasury balance is \$37,118.29. The outstanding obligations are \$30,506.32. The unallotted balance is \$6,611.97. Under M. 1919-20, the Treasury balance is \$124,960.30. The outstanding obligations are \$53,647.68. The unallotted balance is \$71,312.62.

CURRENT YEAR EXPENDITURES.

Mr. SLEMP. Tell us about the expenditures this year.

Col. HARMON. The expenditures which have been made during the current year under this appropriation have been for the maintenance of the matériel in the insular possessions and for the making of certain major alterations in connection with that matériel. The maintenance charges have been the usual charges for the repair and maintenance, which is a current obligation.

Mr. SLEMP. Is it the purpose to return some money to the Treasury out of this appropriation?

Col. HARMON. Yes, sir.

Mr. SLEMP. How much?

Col. HARMON. We expect that there will be about \$14,000 available.

Mr. SLEMP. Does not that leave a considerable balance which will probably yield a bigger return than you are estimating?

Col. HARMON. Under this appropriation of \$125,000 there was unallotted on February 1, \$73,816, and of that we expect to allot about \$60,000 from then until the end of the fiscal year.

Mr. SLEMP. You will return about \$13,000 more?

Col. HARMON. About \$13,816.

Mr. SLEMP. That additional amount might be turned back to the Treasury?

Col. HARMON. Yes, sir. The reason for that is, as with the continental United States, that the work on some of the major alterations has been abandoned and we are not asking for money to complete them next year.

A of F "M" insular possessions.

A detailed estimate for the alteration, repair, and maintenance of seacoast artillery and additional shop equipment follows:

Repair and maintenance of guns and carriages exclusive of 2 turret structures (about 1 per cent of the total value of the above ornament)	\$52,800.00
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Repair and maintenance of 2 turret structures (about 1 per cent of the value of these structures)-----	\$4,347. 00
Spare parts for guns-----	6,885. 00
Spare parts for carriages-----	20,655. 00
Cleaning and preserving material, except for fire-control instruments-----	18,720. 00
Minor alterations to carriages-----	1,760. 40
Replacement of subcaliber guns-----	1,020. 00
Repair and maintenance, spare parts and cleaning and preserving material for fire-control instruments-----	17,361. 00
Total -----	123,548. 40
Major alterations to carriages (see item 9, notes on estimates)-----	36,000. 00
Total -----	159,548. 40

Mr. SLEMP. Please give the details of the estimate.

DETAILS OF ESTIMATE.

The details of the estimate are:

Repairs and maintenance seacoast artillery-----	\$52,800. 00
Maintenance of two turrets-----	4,347. 00
Spare parts for guns-----	6,885. 00
Spare parts for carriages-----	20,655. 00
Cleaning and preserving material-----	18,720. 00
Minor alterations to carriages-----	1,760. 40
Major alterations to carriages-----	36,000
Alterations and replacements to breech blocks, etc-----	1,020. 00
Repair and maintenance fire-control instruments-----	17,361. 00
Changes in 14-inch gun turrets-----	36,000. 00
Total -----	159,548. 40

Col. HARMON. For repair and maintenance of guns and carriages, exclusive of the turret structure, based on 1 per cent of the total value of the above material, \$52,800. This includes the cost of labor and materials for repair, maneuvering materials, and the necessary tools for doing the work. This is based on past experience in this connection and all these figures are slightly less than was appropriated for the past fiscal year.

The second item is repair and maintenance of two turret structures, about 1 per cent of the value of these structures, \$4,347.

The third item is for spare parts for guns, \$6,885.

The next item is spare parts for carriages, \$20,655, which is determined on the same basis as the similar item for the continental United States and about three times the cost of the spares for guns.

The fifth item is for cleaning and preserving material, except for fire-control instruments, \$18,720.

The sixth item is for minor alterations to carriages, \$1,760.40. That is a contingent amount to cover such small alterations as need to be made.

Replacement of subcaliber guns, \$1,020.

Repair and maintenance of spare parts, cleaning and preserving material for fire-control instruments, \$17,361.

Major alterations to carriages, \$36,000.

Mr. SLEMP. That is for the 14-inch gun turret?

Col. HARMON. Yes, sir; that is for the 14-inch gun turret. The two turrets are so situated that one fires over the other turret and

the blast from the upper gun's firing presses in the watershed in such a way that it binds on the barbette armor.

Mr. SLEMP. In 1908 you only asked, under this head, for \$25,000. You asked for varying amounts up to 1917, when you asked for \$79,000, and the committee gave you \$60,000. Since that time you have been given very large appropriations, a lot of which has been repealed. Do you feel justified in asking for this sum?

Col. HARMAN. The amount that we ask for now is approximately twice what we asked for in 1917, which will about cover the cost of the increased labor and material.

Mr. BYRNS. Where are these alterations and repairs made?

Col. HARMON. They are made in the Philippines, except the major alterations which require design work, and the manufacture of parts, which is done in the United States. The designs are laid down here and the parts are manufactured in the shop.

Mr. SLEMP. This also applies to the Hawaiian Islands?

Col. HARMON. Yes, sir; to all the insular possessions.

ALTERATION, MAINTENANCE, AND INSTALLATION OF SEACOAST ARTILLERY,
PANAMA CANAL.

Mr. SLEMP. On page 88, you are asking for alteration and maintenance (and you have put in the words "and installation" apparently) of seacoast artillery on the Panama Canal, \$407,833. That has been reduced, I understand, to \$104,546.40.

Col. HARMON. Yes, sir.

Mr. SLEMP. That reduction is based upon the decision not to make certain major alterations in the carriages to the extent that you first contemplated?

Col. HARMON. Yes, sir.

Mr. SLEMP. What is the state of your balances?

Col. HARMON. The Treasury balance under Panama Canal, M, was \$137,953.27—outstanding obligations, \$47,925.15; unallotted balance, \$90,028.12. Under the act the Treasury balance is \$25,643.49—outstanding allotment, \$6,565.58; unallotted balance, \$19,077.91. Under M, 1920, the Treasury balance was \$99,946.21—outstanding allotments, \$31,196.21; unallotted balance, \$68,750.

Mr. SLEMP. Do you expect to return any of that to the Treasury, this year?

Col. HARMON. Yes, sir. I will give you another statement which we have, based on allotments. The appropriation was \$100,000, the unallotted balance February 1 was \$84,909, the estimated additional allotments to be made was \$50,000, leaving a free balance at the end of the year of \$34,909, which we expect to be able to turn into the Treasury. This item is divided into some subheads. The money which was appropriated last year has been expended in Panama in the current maintenance of the seacoast artillery and material which is located there, the making of the necessary repairs, painting, etc., and for work in connection with major alterations which were undertaken.

Mr. SLEMP. What is the total amount to be expended this year?

Col. HARMON. The total amount we expect to have expended by the end of the year will be \$65,091.

Mr. SLEMP. That is very much less than you have been spending there ordinarily?

Col. HARMON. Yes, sir. I have not the figures of what we have been actually spending in the past. In 1917 there was appropriated \$68,000.

Col. RUGGLES. Up to the time of the war we always spent all the money we had for maintenance and still needed a good deal more. There was never any balance.

Mr. SLEMP. Why do you need those new words "and installation"?

Col. HARMON. I think that should be in there.

Mr. SLEMP. You are not installing anything, are you?

Col. HARMON. Not at the present moment.

Col. RUGGLES. But the reason those words did not use to be in the language was because at one time there was a special appropriation for the installation of the guns, and now, without that word in there, we have no money that is legally applicable to any installation that may be necessary to make; and it should be covered somewhere, and that seems to be the place to do it.

Mr. SLEMP. The emplacements for new guns would come under this language?

Col. RUGGLES. Not the emplacements, but the cost of erecting the guns in the emplacements.

Col. HARMON. The emplacement is provided by the Engineer Corps.

Mr. SLEMP. Will you insert in the record an itemized statement of the details of the same general type as for the insular possessions and the continental United States?

A detailed estimate for the alteration, repair, and maintenance of seacoast artillery follows:

Repair and maintenance of guns and carriages (about 1½ per cent of the total value of the armament)	\$45,600.00
Spare parts for guns	4,811.20
Spare parts for carriages	14,433.60
Cleaning and preserving materials, except for fire-control instruments	20,400.00
Minor alterations to carriages	1,230.40
Replacement of subcaliber guns	480.00
Repair and maintenance, spare parts, and cleaning and preserving material for fire-control instruments	17,591.20
	<hr/> 104,546.40

STATEMENT OF COL. C. L'H. RUGGLES, UNITED STATES ARMY, CHIEF OF THE TECHNICAL STAFF, WAR DEPARTMENT.

PROVING GROUNDS.

Mr. SLEMP. We will now take up the proving-ground question. Col. Ruggles, are you in charge of the Aberdeen Proving Ground?

Col. RUGGLES. I am, sir. It is our business to look after the development of new types and research work.

Mr. SLEMP. You have an estimate before the committee for \$1,563,607, which has been reduced to \$1,200,000.

Col. RUGGLES. And which I would like to reduce again to \$900,000.

Mr. SLEMP. Last year you had for proving-ground services \$400,000?

Col. RUGGLES. Yes, sir; with an available balance at that time of something over \$600,000 in addition to the appropriation. The available balance under "proving ground No. 1, 1918," was \$25,891.08, and under "proving ground, Army," \$577,698.79. There was appropriated last year \$400,000, making a total of approximately \$1,000,000.

Mr. SLEMP. Have you spent all of that money this year?

Col. RUGGLES. We will have spent it by the end of the year.

Mr. SLEMP. Where do you spend this money? What proving grounds are you taking care of under this appropriation this year?

Col. RUGGLES. We spent a small amount at Sandy Hook. We practically closed down Sandy Hook about the middle of August. There is still a little work going on there, cleaning up, etc. We finished up a few tests. We are still shipping a little material to Aberdeen. You know, the idea was that we would give up Sandy Hook after the war and ship the testing facilities there down to Aberdeen. That is about completed. The major part of the money was spent at Aberdeen Proving Ground. I can give you the details.

CURRENT-YEAR EXPENDITURES.

Mr. SLEMP. I think you had better do that.

Col. RUGGLES. There was spent a total under this appropriation of \$17,198.79, and under "other appropriations" \$51,511.01. Of this second item, \$25,813.18 was from the appropriation "Proving ground, Sandy Hook, N. J., 1915" (that appropriation will expire with the giving up of Sandy Hook); and the balance of \$25,697.83 was spent from appropriations authorizing the manufacture of material, which also authorizes test thereof. These appropriations read for purchase, manufacture, and test of certain materials.

Mr. SLEMP. You had some other money?

Col. RUGGLES. That has always been the case. Our appropriation for the proving ground has not been sufficient heretofore.

Mr. SLEMP. Were you in charge of the proving ground at Sandy Hook?

Col. RUGGLES. I was in command of the proving ground at Sandy Hook before the war. I am not in command of Aberdeen now, but I am chief of the technical staff of the Ordnance Department, which looks after the development of new types and experimental work leading up to the development of new types, testing of new types, etc. I am not responsible for the actual cost, but I am responsible that the material we are making is the right kind of material, and that includes the approval of the drawings of the new types. I have associated with me not only ordnance officers but officers of various branches of the service—Coast Artillery, Field Artillery, and the Air Service. We really do most of our work in committee.

Mr. SLEMP. Your particular work is not paid for out of this particular appropriation?

Col. RUGGLES. The work at Aberdeen Proving Ground is paid for out of this appropriation. That is, the testing.

Mr. SLEMP. I mean all the designing work.

Col. RUGGLES. No, sir.

Mr. SLEMP. All the staff work to which you refer?

Col. RUGGLES. No, sir; only the testing work at the proving ground. Now, at Aberdeen Proving Ground the expenditures up to March 1 of this year make a total of \$925,355.10, from which must be deducted the sum of \$339,889.73 spent from manufacturing appropriations that are not a part of this proving-ground item. We do not expect to expend any more manufacturing appropriations this year, as the balance of the proving-ground appropriation will carry us through the year. We expect to spend a total this year at the Aberdeen Proving Ground of \$1,287,444.73, and against that total which I have just quoted we are asking for \$900,000 for next year. Now, before the war we spent at Sandy Hook for this same purpose \$146,525.91 in 1915 and \$143,167.92 in 1916.

Mr. SLEMP. That must have been from some other appropriation, because this item for the proving ground in 1915 was \$56,200, and in 1916 it was the same, \$56,200.

Col. RUGGLES. Yes, sir. The appropriations that have been made have never been sufficient to cover all the tests, and so we had recourse to the clause in the manufacturing appropriations which cover the tests of material. Now, what we have been trying to do so far as the tests at the proving ground are concerned is to carry them as far as possible from the one testing appropriation, because it simplifies the bookkeeping.

Mr. SLEMP. Under which appropriation would you prefer to have it?

Col. RUGGLES. Under the proving-ground appropriation. I stated that last year.

Mr. SLEMP. Do you know whether any estimate in this fortification bill is based upon the theory that a certain portion of the money would be set aside for testing at these proving grounds, and if so, what amount?

Col. RUGGLES. No, sir; I do not think so. The cost of testing is a small percentage of the total cost of the article.

Mr. SLEMP. Take any of these items, "AFC" or "DFG," do they include proving-ground expenses?

Col. RUGGLES. The percentage of testing cost is so small that it would be lost in there. For example, the actual cost of testing the materials is relatively small compared with the cost of making them.

Mr. SLEMP. I am speaking about whether you would be willing to reduce your estimates on the other fortification items if all the expense of testing were paid at Aberdeen?

Col. RUGGLES. I think not. As a matter of fact, I do not think there has ever been made any special allowance for the actual cost of testing in any of these estimates, because it is a very small part of the cost.

Mr. SLEMP. If you will pardon me, you made mention of a small amount, and you also said that there was over \$300,000 for testing cost from the manufacturing appropriation?

Col. RUGGLES. Yes; but it would not be great as compared with the manufacturing cost of materials tested.

Mr. SLEMP. But it is a large amount of money as it appears in the item?

Col. RUGGLES. Oh, yes, sir.

Mr. SLEMP. It is about one-third of the amount of money requested in the estimates, and I was just thinking if with \$900,000 as a total we could reduce the other items to the extent of \$300,000, inasmuch as you do not expect to get any money from these manufacturing item sources?

Col. RUGGLES. Under "DFG" and "B" Col. Jenks says that no test money was included in the estimate.

Mr. SLEMP. And "C"?

Col. RUGGLES. I can not answer that, because Col. Pelot is not here.

PROVING-GROUND ACTIVITIES.

Mr. SLEMP. The next item is for current activities of the proving ground, relating to the testing and proving of ordnance material, guns, ammunition, etc. You do not test every gun that is produced in the Army, do you?

Col. RUGGLES. Every gun is tested there.

Mr. SLEMP. Every single gun that is manufactured is tested there and a certain percentage of ammunition production is tested there?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. All the guns that we have in existence have all passed through the proving-ground test, and therefore we may disregard that matter; that matter is over?

Col. RUGGLES. Practically so. There are a few guns made——

Mr. SLEMP (interposing). There is no estimate for the manufacture of ammunition to any very large amount, nor of guns that will be delivered next year, outside of three or four?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. That being the case, what will you work on over there?

Col. RUGGLES. We have a very large number of problems that we have to solve. In the first place, we are getting a good many new types of guns and a good many new types of carriages, relatively a good many of them, and we have to test the new types.

Mr. SLEMP. Let us suppose that there is no appropriation for those new types. Let us assume that only three or four, say six, of the 16-inch guns will be delivered next year. I will admit that there are some pilot mounts that are in process of manufacture now that will be delivered this fiscal year, or the next year, totaling not over 24 as a whole, and that is all, unless money is appropriated for the manufacture of more of those types for service tests and some new types. So I honestly do not see where the activity of the proving ground comes in, and I am talking about the testing feature now.

Col. RUGGLES. In the case of a new gun, it requires ammunition, such as powder, projectiles, and fuses, which have to be tested; and it also requires cartridge cases in a good many instances, which must also be tested. The gun has to be fired to destruction to see whether it will last for the requisite number of rounds; range tables will have to be made for it; the probability of errors determined, so that it will take about 10,000 rounds to test one new type of gun properly. A new type of gun is like a new automobile. A new automobile is run thousands of miles before the manufacturer decides that it is a serviceable type. So that we give our small guns

of a new type, not the big guns—the number of rounds are reduced especially in the large guns—a very exhaustive test. In doing all this work—the testing of armor-piercing projectiles, the testing of new fuses, the testing of the range and accuracy and endurance of the guns, and the testing of ammunition that goes with it—you have to multiply, as a matter of fact—

NUMBER OF EMPLOYEES.

Mr. SLEMP (interposing). Let us analyze a little further. How many people would you have on the pay roll for this purpose over there?

Col. RUGGLES. Well, before the war, at Sandy Hook, where we fired an average of only 23 rounds a day—so small a number that it was almost negligible—we had a pay roll of about 150, and it cost us about \$150,000 a year. We used also soldiers for a large part of the work which now has to be done by civilians, because we can not get enough soldiers now. We only fired about 23 rounds a day. I think it is admitted by everybody—the service and the Ordnance Department—that the number of rounds was really too small. We were really so short of money that we drew conclusions from an inadequate amount of data. Now, I am only asking for six times that amount of money, and you can divide that by two, because, roughly speaking, the value of the dollar is just about half what it was then. Therefore I am only asking for Aberdeen Proving Ground about three times as much money as we had then, in peace times, at Sandy Hook.

Mr. SLEMP. Is any money out of this estimate to go for land?

Col. RUGGLES. No, sir.

Mr. SLEMP. Any for buildings?

Col. RUGGLES. No, sir.

Mr. SLEMP. Any for ordnance storage?

Col. RUGGLES. No, sir.

Mr. SLEMP. Any for the pay of machinists in the machine shops over there—that is, for altering and changing these guns and fixing them up?

Col. RUGGLES. If it has anything to do with the testing; yes.

Mr. SLEMP. What I am trying to bring out is that there are some activities over there at Aberdeen that have no relation to testing—for instance, the storing.

Col. RUGGLES. No, sir; that is not covered by this appropriation.

Mr. SLEMP. You have a lot of employees there?

Col. RUGGLES. We have a lot of employees there engaged in overhauling and cleaning matériel.

Mr. SLEMP. That is not covered by this estimate?

Col. RUGGLES. No, sir; that is not covered. We frequently break parts of a gun. Frequently we have to test a particular device that is applied to a gun.

Mr. SLEMP. Now, you are speaking in general terms about new guns that you wished to test. Have you on hand a single new gun delivered to you by the Ordnance Department for testing purposes?

Col. RUGGLES. We have guns coming. All these guns that we have been discussing are coming. We have been engaged a large part of

the year in proving guns that we have not had a chance to handle before.

Mr. SLEMP. I think Mr. Byrns brought it out last year that the proving work is entirely through.

Col. RUGGLES. We estimated that it would be through by June.

Mr. SLEMP. That is what I understood.

Col. RUGGLES. Well, we did not get through.

Mr. SLEMP. But you have practically completed the work?

Col. RUGGLES. Yes, sir. We have some 240-millimeter matériel to work on yet, especially that made under war contracts, most of that has been brought there.

Mr. SLEMP. I wish there were some way to connect this \$900,000 to the number of men and the character and type of work that these men are expected to do.

Col. RUGGLES. I can tell you that there will be probably 800 people employed—between 700 and 800—including soldiers and all. Our estimate is that we will fire about 75,000 rounds, total, or 250 rounds a day.

Mr. SLEMP. You would not pay for those rounds out of this appropriation?

Mr. RUGGLES. No; not the cost of the rounds. We estimate that it will cost us about \$12 per round for testing as compared with a peace-time cost at Sandy Hook of \$22 per round. That is because we are going to fire more rounds, principally, because we have an overhead and we have to keep the establishment running, and as the number of rounds increases, the percentage of overhead decreases.

WORK IN CONTEMPLATION.

Mr. SLEMP. What character of guns do you expect to test next year?

Col. RUGGLES. Everything from field guns up.

Mr. SLEMP. Do you expect to test any 75-millimeter guns?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. And the 155-millimeter gun?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. And the 155-millimeter howitzer?

Col. RUGGLES. Yes, sir; and the 4.7 gun.

Mr. SLEMP. And the 240-millimeter gun?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. I thought you said the work of testing the supply of all those guns was already completed?

Col. RUGGLES. I am talking about the experimental guns that we are now making. Most of this work is experimental work. We have our fuses to test. If a fuse is not in the right condition, we have to make a test of the fuse. There were a great many different kinds of fuses during the war. Now, for some reason, during the war the French fuse which we also used had no bore safety device. That is a technical term and it means that the fuse has no means to prevent the fuse from going off in the bore of the gun and detonating and killing a good many people. We had a bore safety device in one of our fuses, but it was only just about developed but we had to take over the French fuses.

Mr. SLEMP. Now, there has been asked of this committee, I think, several hundred thousand dollars for the development and experimentation of fuses?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. Now, your work is——

Col. RUGGLES (interposing). Our work is the testing of fuses. We actually do the firing. We have firing details, people to erect the various apparatuses for firing purposes, and they make reports.

Mr. SLEMP. You have done quite a lot of that work on fuses?

Col. RUGGLES. Yes, sir; we are always doing it. We have been working on fuses for 40 years or more. We have not by any means the right kind of fuse. Nobody had the best fuse during the war.

Mr. SLEMP. Your department would only test such fuses as were turned over to you by the Ordnance Department?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. And the same way with guns?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. And ammunition?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. In case there were no new guns or ammunition turned over to you next year, you would have nothing to do, so far as the existing supply of guns and ammunition is concerned, would you?

Col. RUGGLES. If we were to stop all experimental work and make nothing new, and assuming that nothing went wrong in the service, we could shut up our testing laboratory, because it is really a laboratory.

Mr. SLEMP. When trouble is experienced in the service with guns and ammunition, what is your relation to it?

Col. RUGGLES. It may be something wrong with the powder or with a fuse. We immediately bring in some of that powder or some of those fuses and subject them to an exhaustive test at the proving ground where we have facilities to make an accurate test and see what is the trouble. We have to find out why a thing goes wrong when something does go wrong.

Mr. SLEMP. Do you make chemical tests also?

Col. RUGGLES. Yes, sir. I have in mind a case of powder deterioration, where the powder was giving too high a pressure or not enough velocity, and in that case we would bring the powder back to the proving ground and make our tests and measurements of pressure and velocity.

Mr. SLEMP. Have you a chemical laboratory?

Col. RUGGLES. No; none at the proving ground. We have one at Picatinny. We would send a sample to Picatinny and have it tested, but the actual firing is done at the proving ground, and the same way with fuzes when they go wrong.

Mr. SLEMP. If 25 guns were turned over to you next year, how many men would that keep employed just for that one job? It would not be so very many, would it?

Col. RUGGLES. We had about 112 soldiers and 150 civilians at Sandy Hook, when we had very much less armament to take care of and where we admittedly did not do enough of this experimental work; in fact, very much too little. We would have known much more about our matériel if we had done more firing. For example,

we tried to draw conclusions from 2 or 3 rounds instead of 10 rounds, because it was so expensive.

Mr. SLEMP. Have you been making up for that deficit or deficiency in the past few years by doing a great deal of that work at Aberdeen?

Col. RUGGLES. No, sir; I think they have been pretty busily engaged in testing a large amount of standard matériel that was purchased under war contracts.

Mr. SLEMP. There has been very little testing of new matériel?

Col. RUGGLES. We have done a good deal this year. For instance, there was a discussion of the question of changing the bands, improving the shape of projectiles, etc.

Mr. SLEMP. Did your proving ground discover that new item?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. What percentage of your money was expended on testing standard matériel and what percentage was expended on testing new matériel?

Col. RUGGLES. I should say about half and half. It would be rather difficult to do that; we would have to go into great detail.

Mr. SLEMP. Is there any other proving ground that you need money for outside of Aberdeen?

Col. RUGGLES. No, sir. We have a proving ground at Erie, which is about to be shut down. That was simply a war proving ground.

Mr. SLEMP. Would you need any money out of this appropriation for that purpose?

Col. RUGGLE. No, sir. We have one at Savannah, which is very small.

Mr. SLEMP. Both of those would be very large storage places?

Col. RUGGLES. Yes; but we practically do all our testing work at Aberdeen.

Mr. SLEMP. This also applies to the seacoast artillery, howitzers, tractors, antiaircraft guns, and every kind of war ammunition there?

Col. RUGGLES. Yes, sir; except small arms. It includes also trench-warfare matériel, everything except small arms and small-arm ammunition.

Mr. SLEMP. The number of acres in the Aberdeen Proving Ground area is 35,000?

Col. RUGGLES. Well, there is more than that, because there is land and water, too.

Mr. SLEMP. The amount of money that has been expended on that proving ground is about \$15,000,000?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. And it will be the one principal proving ground for everything except small arms in connection with the Army?

Col. RUGGLES. Yes, sir. I think we can visualize it in this way, that before the war when we did not do very much testing work and did not have as many problems to look into as we have now, because we have learned a lot that we thought we knew and finally found we did not know; we expended \$150,000 at our little proving ground at Sandy Hook, which was known to be inadequate and which required very much less in the way of maintenance, because we had very little maintenance, very little roads and buildings to look after. That little place cost us \$150,000 for testing alone year after year, in peace time when a dollar was worth a dollar, and now I am asking for \$900,000, which is approximately six times that amount, but really

we are only asking for three times that amount, taking into consideration the fact that the dollar is not worth what it was then, about one-half.

MAINTENANCE EXPENSES, ABERDEEN PROVING GROUND.

Mr. SLEMP. What do you ask for purely maintenance purposes? The roads?

Col. RUGGLES. No; the railroad is under this appropriation, but the wagon road is under another appropriation.

Mr. BYRNS. How about your buildings?

Col. RUGGLES. They are under another appropriation, except the buildings used for testing work, but most of the repairs to buildings are done under the sundry civil appropriation bill. While I said repairs to buildings at Sandy Hook, I omitted the items that were covered by the sundry civil bill in determining the sum of about \$150,000 expended yearly at Sandy Hook for test purposes.

Mr. SLEMP. Now, if repairs of roads and buildings are not included in that provision, what maintenance item do you have?

Col. RUGGLES. We can not shut the place down.

Mr. SLEMP. I am not arguing that now. I just want to get at what that maintenance item is, the amount of money you spend on maintenance after the roads and buildings are taken care of. You would not spend any money there to take care of the water situation, because that comes under another appropriation?

Col. RUGGLES. Yes; because this takes its proportionate share.

Mr. SLEMP. And the power plant?

Col. RUGGLES. It takes its proportionate share. The power plant is used in connection with repairs to testing appliances in the machine shops, heat and light, maintenance of water supply and maintenance of facilities for light and heat. Sandy Hook was maintained on absolutely the minimum basis because we had an organization that only fired 22 rounds a day. It was a little bit of a place. If you double that and call it \$300,000, I should say that \$300,000 is the minimum at which we could maintain the place now and do any work at all in case of emergency.

Mr. EAGAN. What was your personnel at Sandy Hook?

Col. RUGGLES. One hundred and twelve soldiers and 150 civilians.

Mr. EAGAN. And at Aberdeen?

Col. RUGGLES. I estimate about 800, including soldiers, next year. Now, I would like to make a little statement. Most of the work at Aberdeen next year will be experimental work. For instance, at the present time we have no satisfactory base detonating fuze. The Navy has none, nobody has any. We expect to fire a good many rounds in order to perfect a fuze that will pierce armor. Now, that can not be done in a few round. You have got to do it slowly. You make a certain change in the fuze and fire a certain number of rounds and then observe the effect of the change. Then you make another change and if that is good, adopt it, and then we make other changes and in that way the development work is done. Now, the same is true of projectiles. The projectile is closely associated with the fuze. It requires a very careful study which can not be made anywhere but at the proving ground.

Mr. SLEMP. Why could you not take over a lot of these appropriations for this experimental and developmental work and instead of having too many organizations working at it, consolidate it into one.

Col. RUGGLES. It used to be very much that way before the war, but under the present arrangement, my organization, the technical staff, indicates what is the line of desirable development; it indicates certain general features that should be obtained. These go to the manufacturing divisions and they draw up a study on paper and submit it to my organization again, and we decide whether or not it will take care of these general features that need development. We get this information not entirely by ourselves, but we have associated with us men from all branches of the service. We have ordinarily two officers from the Coast Artillery, two from the Field Artillery, one from the Air Service, one from the Tank Corps, and so on. We indicate the general proper line of development and get these sketches and say whether they are all right. Then we get the drawings and we approve the drawings. Then, the manufacturing divisions make the matériel and send it to the proving ground for test. That is matériel that we have been familiar with from the beginning, from its inception to its manufacture; and then we test it out and report to the Chief of Ordnance whether that matériel is satisfactory. Generally, after that, we give it a test by the service that is to use it, that is, if it is field artillery matériel it will probably go to Fort Sill and be tested there under service conditions by the Field Artillery.

Mr. SLEMP. But the same set of men, however, could test one thing out and next month they would test another thing out, and next week another and another?

Col. RUGGLES. We know all the time what is going on. We have to approve the designs.

Mr. SLEMP. What I am trying to get at is the force that you would need expressed in definite terms. That is, suppose they had been developing a new type of fuse. Suppose you tell them to do it and they do not succeed. Suppose the men down in the office do not bring you any plans. Then your work stops. You have not anything to test. You can not make their minds function, you know?

Col. RUGGLES. We know what is going to be developed and what is going on.

Mr. SLEMP. Are you sure of any special amount of work next year?

Col. RUGGLES. We estimate that we will probably fire 75,000 rounds.

Mr. SLEMP. On what guns?

Col. RUGGLES. From 75-millimeter gun up. I have the estimate here.

Mr. SLEMP. I think you had better put that in the record.

Col. RUGGLES. It runs up to about 75,000 rounds.

Mr. SLEMP. You put in the record a statement of what you expect to do next year, itemized into rounds and classes of guns and shells, etc.

STATEMENT OF NUMBER OF ROUNDS EXPECTED TO BE FIRED AT THE ABERDEEN PROVING GROUND DURING THE FISCAL YEAR 1921.

1. During the fiscal year ending June 30, 1921, it is estimated that about 75,000 rounds will be fired at the Aberdeen Proving Ground in the test of material completed under board of review projects, in the development of armor-piercing projectiles, the ballistic tests of 12, 14, and 16 inch armor-piercing projectiles, the necessary revision of range tables for seacoast cannon

due to essential changes in the rotating band and in the form of the projectile; in the test of experimental guns, carriages, self-propelled mounts, ammunition, fuzes, etc., which are being developed in accordance with the recommendations of the caliber (Westervelt) board, in the retest of powders, fuzes, etc., which may become necessary on account of the irregularities developed in the service at target practice; and in investigating the condition of ammunition now in storage from overseas.

2. Most of the firing referred to above, whether of material furnished under board of review projects, of railway material, or of material being developed under the caliber (Westervelt) board, will consist in the test of type material. If this material consisted merely of standard material which has been under manufacture for some time and the design of which had been thoroughly tested in the past at the proving ground and in service, the number of rounds to be fired in the test thereof would be limited. Such firing as is done would be in the nature of a precautionary measure as a final check of the inspection which began with the raw material and would be analogous to the short road test given the stock automobile at the factory before it is shipped to the purchaser. However, in the test of new types the Ordnance Department must fire a large number of rounds and go as far in satisfying itself that the new design is right before it can be accepted for service use as the automobile manufacturer goes in the test of a new model of car before he feels safe in placing it on the market.

3. The test of all new types must be an endurance test, to determine whether the functioning of every part of the new mechanism is satisfactory and remains satisfactory throughout the expected life of the gun and carriage. We must assure ourselves that new guns placed in service will not break down by continued use, that the parts of the carriage will not wear so much by continued use that the accuracy of the weapon is affected detrimentally, and that the number of parts requiring replacement due to breakage or wear is not so great as to materially hamper operations in a campaign, etc. The number of rounds to be fired, therefore, is determined primarily by the necessity for giving a proper endurance test to the new design.

4. Even if no endurance test were necessary, however, each element of the new design must be thoroughly tested, after first adjusting it to assure ourselves that it works efficiently when new and continues so to work during the life of the carriage and gun. Some of the tests required in this connection are as follows:

Determination of the pressure in the recoil mechanism.

Velocity of recoil and counter recoil.

Time to load and fire a certain number of rounds under different conditions.

Dust and rust test of breach mechanism and carriage.

Accuracy of the gun at various ranges.

Stability of the carriage under all conditions.

Holding ability of spades in various kinds of soil.

Adjustments of variable lengths of recoil.

Satisfactoriness and convenience of manipulation of sights and of elevating and traversing mechanisms.

Convenience of loading and serving the piece at all angles.

Muzzle velocity of projectile.

Pressure in the bore.

Range to be obtained with various charges.

Test of powder, projectiles, and fuzes for the new piece, etc.

In the tests just mentioned it is not necessary to fire additional rounds, for these tests may be made during the main endurance test of the carriage and gun.

5. The experience obtained during the war shows the desirability not only of new types of cannon, but the necessity for vastly improving our propelling powders, high explosives, projectiles and fuzes. Great difficulty was experienced with smokeless powder during the war by reason of its absorption of moisture, causing some shots to fall short and fail to reach the target. The development of a smokeless powder which will not absorb moisture is therefore most desirable and is required by the caliber (Westervelt) board. Much difficulty was experienced by all armies from premature bursting of high-explosive shell in the bores of the guns, killing the cannoneers serving the piece. The necessity of designing fuzes that will not be subject to this weakness is therefore obvious. About 1 projectile in 20,000 bursts in the bore of the gun and it is desired to improve the fuze so that this weakness will be

entirely eliminated, or at least reduce the number of premature bursts to a negligible percentage of rounds fired.

6. The flash which is present when the gun is fired with the smokeless powder used in the war exposes the position of guns during firing, and it is very necessary to obtain a smokeless powder which will not give this flash. It is a practicable thing to do this, but much experimentation is required. Failure of many high-explosive projectiles to burst on impact, giving what were called "duds," was a very serious feature of the ammunition of all armies. The necessity for perfecting our knowledge of loading high-explosive shell to overcome the large percentage of "duds" is obvious and this requires many rounds to be fired at the proving ground. Of course, the vital questions, such as have just been mentioned with respect to ammunition, can not be solved by firing a small number of rounds, but here again it is fortunate from the point of view of economy that a large proportion of the rounds necessary for the endurance test of guns and carriages can be utilized in the development of ammunition.

7. In accordance with the principles explained above, the following table has been prepared showing the contemplated number of rounds to be fired next year at the Aberdeen Proving Ground in the test of new material and of old material returned from France, and to investigate irregularities developed in the service at target practice:

	Rounds. contemplated number.
Caliber board projects:	
Infantry howitzers, carriages, and ammunition.....	2, 000
Pack howitzers, carriages, and ammunition.....	2, 000
75-millimeter divisional gun on carriage and self-propelled mount and its ammunition.....	12, 000
105-millimeter divisional howitzer on carriage and self-propelled mount and its ammunition.....	12, 000
4.7-inch corps gun on carriage and self-propelled mount and its ammunition	9, 000
155-millimeter corps howitzer on carriage and self-propelled mount and its ammunition.....	9, 000
155-millimeter Army gun on carriage and self-propelled mount and its ammunition.....	6, 000
8-inch Army howitzer on carriage and self-propelled mount and its ammunition	3, 500
8-inch 50-caliber gun and railway mount.....	440
12-inch, 20-caliber howitzer on railway mount.....	150
14-inch 50-caliber gun on railway mount.....	440
16-inch 25-caliber howitzer and railway mount.....	200
3-inch antiaircraft gun, self-propelled mount and ammunition.....	2, 500
4.7-inch antiaircraft gun, self-propelled mount and ammunition.....	2, 000
Caterpillar adapters for 8-inch howitzer and 155-millimeter gun (12 sets for acceptance test).....	60
6-inch trench mortars and carriage.....	1, 000
Other than caliber board projects:	
18 10-inch sliding railway mounts, model of 1919.....	150
12 12-inch railway carriage pivot mounts.....	110
20 14-inch 50-caliber guns.....	80
1 16-inch 18-caliber howitzer railway carriage pivot mount.....	30
1 16-inch howitzer barbette carriage, model of 1920 (3) ¹	510
1 16-inch 50-caliber gun, model of 1919, and 1 16-inch gun barbette carriage, model of 1920 (4) ¹	320
1 16-inch 50-caliber gun, model of 1919, and 1 16-inch disappearing carriage, model of 1917.....	30
Firings for revision of range tables for existing 6, 8, 10, 12, and 14-inch guns and 12-inch mortars due to essential changes in ro- tating band and form of projectile.....	2, 000
Development of armor-piercing projectiles which will penetrate armor at greater angles of oblique impact than those now in use and of a fuse for these projectiles.....	375

¹ The numbers in parenthesis indicate the number of units of this type which will be completed during the year.

	Rounds, contemplated number.
Other than caliber board projects—Continued.	
Ballistic test for acceptance of armor-piercing projectiles—	
12-inch, 54 lots, 4 rounds per lot.....	216
14-inch, 23 lots, 4 rounds per lot.....	92
16-inch, 28 lots, 4 rounds per lot.....	112
Continuation of firings in 3.3-inch gun to determine the best shape of projectile, the proper twist of rifling for various shapes, and the general laws of air resistance.....	5,000
Proof firing 37-millimeter subcaliber tubes for existing 75-millimeter, 4.7-inch and 155-millimeter guns, and 155 millimeter and 8-inch howitzers.....	500
For continuance of the development of bombs, bomb sights, fuses, and release mechanisms it is contemplated that 3,000 bombs of various types will be dropped.	
Proof firing, 2.24-inch tank gun, test of its mount and ammunition.....	1,000
Tests of guns manufactured by the autofrettage process.....	3,000
Total.....	75,815

Col. RUGGLES. Yes, sir. Now, I would like to make a statement in regard to our experimental work, because the proving ground is largely for experimental work, particularly for next year.

Naturally the tremendous use of munitions during the World War showed up many deficiencies in existing designs and indicated numerous ways in which they were capable of improvement. This applies not only to types long in use before the war but to new types, such as the armament of aircraft and bombs with their accessories used with aircraft. As Gen. Williams said last year, we are actually faced now with many more problems requiring investigation than we were before the war. That is because we know more. As we know more about these things we see where they are defective and where they should be improved.

Some of the problems that arose during the war were at least partially solved, while others could not be, because time and opportunity did not exist. Other nations are now engaged in attempting to solve these problems, and if the United States does not make an effort to do so it will fall behind in its knowledge of ordnance and in its preparation for future emergencies. That is, if we do not go to work and study this thing out, other people will, and we are going to drop behind.

The department is attempting—and I think Congress sympathizes with the idea—to keep skeleton organizations in our arsenals, so that the knowledge of munitions production in the United States shall not entirely lapse. We do not want to forget how to make these things. Similarly, if sufficient funds are not available for design and development, the organization of engineers and designing draftsmen built up in the Ordnance Department will have to be disbanded and the personnel will have to seek employment in commercial life. Practically the only organizations of ordnance designers in this country are maintained by the Government in the Army and the Navy. The policy of the United States has not been such as to develop in this country large private concerns making a specialty of dealing in ordnance, who for reasons of profit can maintain a large staff of ordnance engineers and draftsmen, as is the case in England and France, and as was the case in Germany.

Mr. EAGAN. They had other markets for their material?

Col. RUGGLES. Yes; the French and English people sell to the South American countries, but we do not do that. We depend for our knowledge of designs on the Ordnance Department of the Army and on the Ordnance Department of the Navy, and the point I want to bring out is that if we are going to drop the idea of future development we have got to lose all our people, and we will have no talent in the United States that knows anything about the improvement of ordnance. Therefore, if the organization in the Ordnance Department is broken up, it will mean the disruption of the only real organization of this kind that exists in the United States outside of the Navy Department.

It is well understood by engineering firms in civil life that the art of engineering, of which ordnance is a part, can not stand still. It will either deteriorate or advance. Firms like the Du Pont Co., the General Motors Co., the General Electric Co., the Westinghouse Manufacturing Co., and others spend large sums annually, first, in research for solving special problems, developing new processes, and investigating new fields of activity; and, second, in improving existing designs of machinery and apparatus and the development of new and improved types of apparatus. Now, I am almost quoting exactly from some of the letters that I received from these people. If these firms did not do this, they would not keep abreast of the times, their products would not hold the approval of their customers, and their business would fall off and eventually would be ruined.

The amount spent in research and development work by a few representative concerns, who have been good enough to furnish the information to the Ordnance Department, runs from 1 per cent to 4 per cent annually of the gross sales. It will run into the millions with some of them.

Now, it is a little hard to draw an exact parallel between ordnance and commercial development work, but since munitions are ultimately intended only for war, a comparison of ordnance development work with commercial development work requires us to consider war expenditures as gross sales and to divide a percentage of war expenditures for development purposes over a term of years. Approximately \$15,000,000,000 was appropriated by the United States for ordnance during the World War, and about \$5,000,000,000 was expended. Now, if we take 2 per cent of these amounts for development and experiment work, we have \$300,000,000 and \$100,000,000, respectively; and if we spread the expenditure of these sums over a period of 25 years, we would spend \$12,000,000 or \$4,000,000 per annum, respectively. We would not expect to spend such sums every year; however, immediately after a big war there will be many more problems pressing for solution than after a period of prolonged peace, and it seems to the Ordnance Department a wise policy to attempt the solution of these problems while they are fresh in the minds of all concerned and while we have an organization capable of their solution.

Now, the main idea I have tried to express is that we absolutely can not stop experimental work, because if we do so we will not have anybody left with us that knows anything about it, and the art will be lost in this country and we will have to go abroad for it. If we do not attempt to find out what is the matter with our ammunition, why our fuses do not give always proper detonation, how we can

make them more safe, get a longer range in our guns, and get smokeless powder that will not deteriorate from moisture, or how we can get a flashless powder that will prevent us from giving away our position to the enemy, other people will do it, and we are going to be very much handicapped in another war. If we follow the same course as in business life, where the money value of experimental work is taken into consideration, we will surely spend some part of our war cost in time of peace in purely experimental work, and particularly now, when we are not going to do much in the line of quantity production.

Mr. SLEMP. I do not see that your statement is correct, so far as any estimate is concerned, because the estimate now, even as reduced, is about four or five times the estimated production before the European war, in spite of the fact that we have this tremendous amount of ordnance matériel in stock.

Col. RUGGLES. We are not going to produce any more field artillery matériel in quantity, and no more field artillery ammunition. We are going to do some seacoast work because that is not war work. Of course there will be some small-arms ammunition made to replace that used in target practice.

Mr. SLEMP. It is nearly six or eight times as much as it was before.

Col. RUGGLES. The tremendous amount is for maintenance. Now, the amount of work at the proving ground will depend to a large extent on the amount of money that Congress gives us.

Mr. SLEMP. You test matériel that is developed?

Col. RUGGLES. And the development consists in a good deal of firing. For example, in the development of a fuse they may make 20 different samples, and they may test them 20 times before the right fuse is determined upon. They make a change, and it does not quite work out, and they make another change.

Mr. BYRNS. It is a part of the development?

Col. RUGGLES. Yes; it is a progression.

Mr. SLEMP. I am differentiating between testing and developing.

Col. RUGGLES. Well, testing is developing. You may test a thing 20 times before you get it right.

STATEMENT OF COL. EDWARD P. KING, JR., ASSISTANT TO THE CHIEF OF FIELD ARTILLERY, UNITED STATES ARMY.

Mr. SLEMP. Col. King, what position do you occupy in the Army organization?

Col. KING. Assistant to the Chief of Field Artillery. I am here to represent Maj. Gen. William J. Snow, Chief of Field Artillery, who is absent from the city on a trip of inspection, and I wish to make a statement in regard to the experimental work, which, I understand, was touched on yesterday, and certain correspondence of Gen. Snow was quoted here.

Mr. SLEMP. Yes.

EXPERIMENTAL AND DEVELOPMENT WORK, FIELD ARTILLERY.

Col. KING. The Chief of Field Artillery is extremely anxious to have the development of the field guns and tractors pushed to the

utmost. In that connection, I want to make it clear that no quantity production is anticipated, but that in order to develop and learn its practicability it is necessary to build several of each type of tractor in order that it may be subjected to tests.

We have now a quantity of matériel; we are in better position in that regard than ever before. The Chief of Field Artillery does not ask that this matériel be scrapped, and new matériel be bought in place of it; but when we do enter another war it will be necessary to produce matériel in quantity, because matériel will be worn out rapidly under war conditions. Now, if prior to the beginning of a war we have developed a special type of gun and tractor, we will be in position to go into quantity production at that time and keep abreast of our enemies. The Chief of Field Artillery believes that whatever can be done to develop improved types of artillery matériel for this country should be done. A board of Artillery officers was convened shortly after the armistice for the purpose of studying the armament of all the armies engaged in the war, and finding out from that study what the ideal in field artillery matériel would be in the future. That board consulted not only American officers who were available in France, and who had seen service in this war, but also allied officers, and they laid down a program which we may term "ideal." Now, the Chief of Field Artillery is anxious for the development of that program, not with the idea of quantity production of any particular item, but with the idea of having a design ready, so that when we need it we can go into quantity production.

Mr. BYRNS. I take it, Colonel, that if this work is not done now, that it is a matter of fact that a great deal of information growing out of this war will be lost?

Col. KING. I think it is inevitable that it will be lost.

Mr. SLEMP. Now, this was the possible criticism that I had of your program—what I had in mind was this: Under a general authorization of Congress last year you went ahead to produce several different types. Now, before you receive those types at all, before they are turned over to you, and before you have tested them in any way, you ask for an appropriation for more of those types.

Col. KING. I do not understand that they are of the same types.

Mr. SLEMP. Yes; you make this distinction: You make the distinction of a service test and a proving-ground test; that is to say, you are going to have your service test, which requires six or eight months, and then they are to be sent out into the field?

Col. KING. Yes, sir.

Mr. SLEMP. Now, my thought is—and it seems to me that you are not in any special hurry about it—that you had better wait your test on the Aberdeen Proving Grounds before you ask for more money for a service test; because you may want to change your model.

Col. KING. But even after it is tested at the Aberdeen Proving Grounds a service test may develop the desirability of changes. I think it is desirable to run those tests at the same time, because we may develop things in the service test that are not developed in the test at the Aberdeen Proving Grounds at all.

Mr. SLEMP. Well, wouldn't you wait for the testing of the service mounts until after you had made the tests of your pilot mounts?

Col. RUGGLES. We would do that.

Mr. SLEMP. But you are asking for money for the production of guns for service tests for certain types before you have produced the pilot mounts?

Col. JENKS. Yes; we think our program will be sufficiently advanced next year to begin the service tests; that is the program. Whether or not we will be able to live up to the program we are not positive at this time, but we must have a program.

Col. RICE. I think we should say another thing, Mr. Chairman. It would be an unusual thing if we got our first type just right. It is not a question of spending a certain amount of money and having one gun and carriage; it is a question of getting the proper type.

Mr. SLEMP. That is the point; I thought you ought not to ask for your pilot mounts until you had tested your service mounts; that seemed to me to be the logical course.

Col. RICE. There are certain types; we may find them suitable at the proving grounds, but it may be that there are two or three different kinds that we may want to test to see which is the best for artillery use with the troops.

TRACTOR PRODUCTION AND DEVELOPMENT.

Col. KING. The Chief of Field Artillery is asking only that we go ahead this year. This is purely an ordnance proposition. I only desire to defend the making of this development.

I would like to say a word regarding tractors. Gen. Snow has notified the Ordnance Department that he would not require production of the 2½-ton tractors for the motorization of all light regiments even though it should be determined to motorize all the light regiments with 2½-ton tractors as a result of existing experiments. He made that statement on the agreement that development of the 2½-ton tractor was to continue, and it was to be produced in a small quantity for a service test.

Mr. SLEMP. That is absolutely consistent with the Westervelt Board report on the 2½-ton tractor, isn't it?

Col. KING. Yes, sir. Now, having that development, Gen. Snow is willing to equip light regiments with the 5-ton tractors, and not demand quantity production of a new type. But he does desire that the new type be developed so that when we do require more than are on hand we will be ready to go into quantity production.

Mr. SLEMP. Therefore the Chief of Field Artillery is willing to have eliminated from the bill the estimates for the motorization of the four regiments with the 2½-ton tractor and use the old stock?

Col. KING. Yes; so long as this new tractor is developed and produced in sufficient quantity for a proper service test; that is all he is interested in.

Mr. SLEMP. So long as Congress is appropriating some money for the development of this new type of tractor which is not perfected?

Col. KING. And so long as the 5-ton tractors are sufficient for the purpose.

Mr. SLEMP. And you do have enough 5-ton tractors, because you have them on hand?

Col. KING. They are actually now motorized with 5-ton tractors.

Mr. SLEMP. I am glad to hear you say that; that is exactly what I had hoped for.

Col. RICE. Mr. Chairman, the same reasoning applies to these guns that might range 50 per cent more. These outrange the French gun by two or three thousand yards.

Mr. SLEMP. Have you anything further on this, Colonel?

Col. KING. No, sir; I simply wanted to give the position of the Chief of Field Artillery regarding this development, and if there are any questions or any information I can give you, I would be glad to have an opportunity to give it.

Mr. SLEMP. The Chief of Field Artillery would not expect Congress to appropriate money for the production of every single type mentioned in the Westervelt Board's report, would he?

Col. KING. I think we should try to develop pilots of the different types.

Mr. SLEMP. Hadn't you better select one or two? As I remember that Westervelt report, it argues very strongly for the howitzer as a companion piece to the 75 gun.

Col. KING. Yes, sir.

Mr. SLEMP. And then it is limited to the service test?

Col. KING. Yes, sir.

Mr. SLEMP. And then you are ready for the others?

Col. KING. Yes, sir.

Mr. SLEMP. There isn't any other gun in there that is along the same line, is there?

Col. KING. I think that is the only similar development in gun manufacture, but so far as automotive power is concerned, its application to artillery is very new; it is all in the experimental stage, and we need all the types they recommend. In other words, the ability to motorize will depend not only on the performance of the particular automotive equipment under test, but on other types of automotive equipment that is going to supply ammunition and various other types of supplies. For that reason, all the different types of automotive development that the Westervelt Board recommends are more or less interdependent, and we ought to try to develop all those types.

Mr. SLEMP. You mean caterpillars, and so on?

Col. KING. Yes; and trailers.

Mr. SLEMP. We had a pretty good program for that, didn't we?

Col. JENKS. Yes; the program includes those items.

Col. KING. I think they are all in the program now, and the Chief of Field Artillery desires to give his indorsement to them, and to emphasize its importance.

Mr. SLEMP. We thank you very much.

PURCHASE, MANUFACTURE, AND TEST OF SEACOAST CANNON, COAST DEFENSES, INSULAR POSSESSIONS.

Mr. SLEMP. The next item is on page 71, "For purchase, manufacture, and test of seacoast cannon for coast defenses, including their carriages, sights, implements, equipment, and the machinery necessary for their manufacture in the arsenals, \$2,500,000." This is for the insular possessions?

Col. JENKS. Yes, sir.

Mr. SLEMP. That has been reduced to \$718,000?

Col. JENKS. Yes, sir.

Mr. SLEMP. Why do you reduce it?

Col. JENKS. The first estimate under this appropriation called for four 16-inch howitzers and howitzer carriages and two 16-inch guns and gun carriages. The four 16-inch howitzers and carriages have been cut out at the direction of the War Plans Division of the General Staff, and the estimates now submitted are for the two 16-inch guns and gun carriages, and to cover the procurement of the material only.

Mr. SLEMP. Have you any money on hand out of previous appropriations?

Col. JENKS. The unallotted balance at present under this appropriation is \$249,405.40, and the Treasury balance is \$398,857.40.

Mr. SLEMP. Have you spent very much money this year under this appropriation?

Col. JENKS. We are spending practically nothing under this appropriation this year, and practically that entire balance will be available for reappropriation.

Mr. SLEMP. How much—\$700,000?

Col. JENKS. The total estimates are \$718,300, of which \$111,000 represent contract authorizations.

Mr. SLEMP. This really involves only the purchase or manufacture of two 16-inch guns for installation at Barbers Point, Hawaii?

Col. JENKS. Yes, sir.

Mr. SLEMP. Of course, you could not get them delivered this year, and therefore an authorization would meet it?

Col. JENKS. We should have some cash to pay for materials that would be delivered during the coming fiscal years, but the major portion of the big forgings and big castings would be delivered after the close of the fiscal year.

Mr. SLEMP. How much would you absolutely require out of this \$700,000?

Col. JENKS. The original estimate was made up on the basis of \$607,300 cash out of a total of \$718,300. If the half of the total sum were in cash, I do not think we would have any difficulty in making suitable contracts.

Mr. SLEMP. Is this a Board of Review project?

Col. JENKS. That is my understanding.

Mr. SLEMP. This is recommended by the Chief of Coast Artillery?

Col. JENKS. Yes, sir.

Mr. SLEMP. Has all of the War Department functioned on it?

Col. JENKS. Yes, sir.

Mr. SLEMP. And the Army and Navy Joint Board, or is it necessary for them to join in on it?

Col. JENKS. I do not think so in this case. I think it is under the War Department only.

Mr. SLEMP. If this were not allowed, you would have to take 2 guns out of the 12 that we have. You could take them out of that number, could you not?

Col. JENKS. That is a question of which I have no knowledge, as it is controlled by the Office of the Chief of Coast Artillery.

Mr. SLEMP. I think it could be done very readily. You are asking for three spare guns.

Col. JENKS. Those spare guns include no carriages or accessories.

PURCHASE, MANUFACTURE, AND TEST OF SEACOAST CANNON FOR COAST DEFENSES AT PANAMA.

Mr. SLEMP. The next item is on page 88, for the purchase, manufacture, and test of seacoast cannon for coast defenses, etc., \$5,000,000. That is at Panama, and the item has been withdrawn.

Col. JENKS. The original estimate of \$5,000,000 under DFG, Panama, has been withdrawn.

Mr. SLEMP. Have you any money on hand now?

Col. JENKS. The present Treasury balance is \$254,501.94, of which \$219,135.86 is unallotted.

Mr. SLEMP. Is that included in the statement of Col. Gatchell?

Col. JENKS. In the financial reports that have been submitted, it is estimated that one-half of the balance would be used this fiscal year. I expect we will turn back practically all of our Treasury balance.

Mr. SLEMP. It was the intention to install all of those guns on Toboga Island, was it not?

Col. JENKS. Yes, sir.

Mr. SLEMP. Is that under the Board of Review project?

Col. JENKS. I can not answer that question.

Mr. SLEMP. The reason for its postponement is because there is not coordination on this plan between the Army and the Navy as to the desirability of it?

Col. JENKS. I am not familiar with the details of this project or the reason for it, because I have not served on any of the boards which have considered this.

The fortification estimates submitted to Congress for the fiscal year 1921 aggregated \$117,793,000. Because of the size of this total it was felt that the question of priorities would arise in the hearings before the congressional committees. To meet this question the War Department decided upon a classification of the estimates which would show in one class those items for which an appropriation this year is deemed essential, and in another class those items for which an appropriation this year is deemed desirable but not essential. The item of \$5,000,000 for the construction of additional armament for the Panama Canal was placed in the latter class, not only because of the large amount of the item, but also because the exact character of the additional armament for the canal is now under study by the department commander, assisted by the local naval authorities, and it is possible that the results of these studies may indicate the advisability of modifications in the character and amount of the additional armament for the Canal Zone proposed in the project for the board of review.

WM. LASSITER,
Colonel, General Staff,
Acting Director, W. P. D.

SATURDAY, MARCH 27, 1920.

STATEMENT OF MAJ. GEN. F. W. COE, CHIEF OF COAST ARTILLERY.

CONDITION OF SEACOAST AMMUNITION SUPPLY.

Mr. SLEMP. Gen. Coe. I believe you wish to make a statement in regard to the condition of our seacoast ammunition.

Gen. COE. I wish to make a brief statement relative to the policy regarding the ammunition supply which was adopted by the War Department upon my recommendation in December, 1919.

Prior to the outbreak of the World War the measure of the artillery strength of armies was based upon their gun-supply and their gun-production program. The war changed that entirely, and the basis came to be the ammunition supply and the program for the production of ammunition. After the battle of the Marne, the French and German armies faced each other for weeks with empty guns and gaping muzzles.

Another aspect which was totally changed for the coast artillerymen of our country was what would possibly or probably constitute a naval engagement. We had, perhaps, visualized such an engagement as the firing of 10 or 20 rounds per gun on a pleasant afternoon under conditions such as we frequently have at our target practices; but an engagement, as we see it now, after war experience, is a thing that does not last for an hour or two hours, but lasts for weeks. If any attack is ever launched upon our coast line by any power, it will not be simply a matter of a few hours but it will be of such a determined nature that it will require all of the resources we can possibly bring to bear for weeks to defeat it.

I therefore made the recommendation to the War Department last November that the basis of the ammunition allowance should be the accuracy life of the gun, and I also pointed out at that time the fact, which I referred to in my original statement to the committee, that our present ammunition allowance was defective and that we should not place reliance in it as it is based upon false premises.

Mr. SLEMP. Defective in amount or character?

Gen. COE. Defective in both, but the point that I emphasized was the defect in character. The battle of Jutland, as I stated before, demonstrated the defective character of the British ammunition which corresponded almost exactly to our Coast Artillery ammunition; this fact was so clearly shown that the entire British ammunition supply of the Grand Fleet was replaced during the war.

Now, my recommendations to the committee with reference to the ammunition supply are as follows:

That for any gun project which is under way, the ammunition supply providing for the full accuracy life of the gun should be considered at all times as a part of the project. We secure no defense from guns unless the ammunition supply is provided, and I can not see any logical ground for not completing a project, including the ammunition supply, before new projects are undertaken; it was that point that I mentioned before.

The second recommendation which I would make to the committee is that the ammunition supply of the insular possessions, with the type of projectile which we are now securing, be provided in full at once.

Beyond that, I desire to inform the committee that our ammunition supply is both deficient, and defective; if the committee, in its judgment, taking into consideration the political situation of the world at large decides that no additional funds should be expended for replacements or for increasing that ammunition supply, I have nothing to urge in that direction.

Mr. SLEMP. You make a distinction between guns that are now under production and to be installed in the future and those now

in existence in the sea-coast fortifications in continental United States, do you?

Gen. COE. I do; yes, sir.

Mr. SLEMP. Is the ammunition supply of the 12-inch long-range guns considered good against any type of naval vessel, or naval armament, and if not what type of naval vessel or naval armament is it not good against?

Gen. COE. It is impossible to give more than an opinion on that subject, but my opinion is that against 3 inches of deck armor the 12-inch gun would probably make a successful attack at ranges where the necessary biting angle could be secured; that is, where the angle of fall is 30° .

Mr. SLEMP. What about the side penetration?

Gen. COE. I do not think our 12-inch shell would get through the side armor of any modern battleship. By modern I mean a battleship launched subsequent to 1910 or even earlier.

Mr. SLEMP. Then why was it that you asked for ammunition of this type all along from 1910 up until the present time?

Gen. COE. Because we had the same thought on that subject that the British Navy had; that the 12-inch shell was an effective projectile. The battle of Jutland demonstrated that it was not an effective projectile. Furthermore, the 12-inch shot which we had produced up to the time of the war is a projectile inferior to that now being produced. During the war factories developed the ability to make a projectile which would stand up better in getting through armor plate.

Mr. SLEMP. When did the various nations of the world adopt the 3-inch deck protection for their battleships and to what extent; that is, how many vessels are there in the world now that are so protected?

Gen. COE. I should say from 1900 to 1910 the deck armor increased from an inch and a half to three inches.

Mr. SLEMP. Is it the contention then that every vessel of the major type since 1910 has been equipped with 3-inch armor or better on their deck and that none of the projectiles we have been making for our 12-inch long-range guns since 1910—and we have spent millions of dollars upon the advice of the War Department upon that type—will penetrate that deck armor?

Gen. COE. I think our shell will not get through. I think the shot we have on hand will get through.

Mr. SLEMP. You make a distinction between the guns and mortars, one for the deck and the other for the sides?

Gen. COE. Of course, until we mounted our 12-inch guns on the long-range carriage, we could not attack the decks because the angle of fall was not sufficient. Only our mortars attacked decks until we mounted the 12-inch rifle on the long-range carriage when we could reach out to 27,000 yards and attack the deck.

Mr. SLEMP. Are the contracts now for the same type of shell of which you have a supply on hand?

Gen. COE. No; we have modified those contracts just as far as we could toward the procurement of a better projectile. We cancelled all of the shell contracts we possibly could that were made during the war.

Mr. SLEMP. But the quantity of effective shell on hand for the 12-inch guns corresponds to the hitherto Board of Review project for those 12-inch guns.

Gen. COE. I have not the exact figures to answer that before me, but I can say in general terms that the present ammunition on hand and under contract corresponds very closely to the ammunition allowance laid down by the Board of Review.

Mr. SLEMP. In 1915?

Gen. COE. In 1915. It would take some time right now to figure out just exactly whether there was any excess or deficiency for the reason that ammunition allowance was based upon varying mounts for guns located in different places, being 100 per cent for the foreign possessions and 50 per cent for the continental United States, but I am sure that that is a fairly accurate statement.

Mr. SLEMP. I do not quite follow your line of argument, though, Gen. Coe, when you say that this ammunition which you now have on hand will not be good, generally, against vessels constructed since 1910, and yet you did not bring that to the attention of Congress in either 1910 or 1911, 1912, 1913, 1914, or even in 1915.

Gen. COE. No, sir; nor even in 1916, because we were manufacturing projectiles still with the idea that the shell would—

Mr. SLEMP (interposing). Is not this the first time that this suggestion has been made to Congress about this particular ammunition?

Gen. COE. Yes, sir; as regards that particular ammunition, and it is based largely upon the result of the Battle of Jutland which became known to us during the last year and a half.

Mr. SLEMP. Did not the War Department continue the manufacture during the fiscal year 1920 of those very 12-inch shells?

Gen. COE. No, sir; we canceled all of the 12-inch shell contracts we could.

Mr. SLEMP. Did you produce any at all?

Gen. COE. There were some contracts so far under way that they could not be canceled.

Mr. OGDEN. What character of test did you make of projectiles between 1910 and 1918?

Gen. COE. We made no tests of projectiles except the acceptance tests, which were made every time a lot was accepted. The Ordnance Department had great difficulty in getting manufacturers to accept contracts which would come up to the specifications that were desired.

Mr. SLEMP. When did the Battle of Jutland take place?

Gen. COE. In May, 1916, but, of course, the results of the battle were not known to our ordnance people until some time later. They were considered extremely confidential during the war, and, in fact, many of the facts about that battle are still hard to obtain.

The CHAIRMAN. Referring to your statement with regard to having a supply of ammunition sufficient for the accuracy life of each gun that you propose to have installed, is not that an excessive amount of ammunition when you consider that our means of transportation between fortified places is quite rapid, and that no power could attack all of our forts at the same time, and when an immediate exchange of ammunition, when needed, could be secured to meet any possible attacks, and, at the same time, not require such a tremendous supply of reserve ammunition?

Gen. COE. Of course, we will do everything possible to transfer ammunition as needed in case of war, and in case of a war where only one ocean is involved, I have no hesitancy in saying that a 50 per cent supply would be all that would be necessary.

The CHAIRMAN. But you would have no occasion to ship if you had a supply equal to the accuracy life of every gun. When your gun was worn out, so far as its accuracy life was concerned, your ammunition would be gone, and you would need a gun before you needed more ammunition.

Gen. COE. I think we would be shifting guns as fast as we would ammunition. That would be quite a possible thing. It was done on the Belgian coast, of course, and guns were brought there continuously, and I have no doubt it was done at the Dardanelles, where the attacks lasted for months.

The CHAIRMAN. It does seem to me that to work out a program of that kind requiring enough reserve ammunition to equal the accuracy life of every gun in every fort is a pretty big proposition, and it is very different from anything that we have ever considered before.

Gen. COE. That brings up another point which I would like to bring out, and that is this: Possibly the committee may have gotten a wrong impression from some of my statements with regard to the railway artillery; that is, that I was belittling in any way the present projects, or those originally recommended by the board of review and which are in process of execution. I think that the projects under way should be carried out, but I think also that the development of railway artillery will modify materially further work on those portions of the project of the board of review, which have not been touched.

With reference to the ammunition supply for those projects, they are all, considering the length of our coast line, and considering the vital points which they protect, within a very low minimum of what would be required in the defense of those places, and I believe that it is not unreasonable to recommend, in the completion of those major caliber big gun projects, that every gun should have its full ammunition supply. It is, I admit, quite conceivable that in the case of the old guns we can not expect to have a full ammunition supply equal to the accuracy life of the piece, and, in fact, I would not expect to obtain such a result finally. But, I think, as a general policy for our projects, that should be the basis of our computation. As to whether the older guns should be supplied with that ammunition or not is for the consideration of the committee, which has to take into account all the varying conditions in the world.

Mr. SLEMP. Do you not really share the view that the next 10 or 15 years will be, perhaps, a period for the world to take stock of itself, make investigations, developments, experiments, etc.? That is to say, applying that idea to projectiles, you would ask for money for a better type of projectile, of longer range, of more accuracy, and other features, and do you not think that Congress might well give some attention to that phase of the subject rather than to heap up a lot of ammunition that would be produced without having had the results of those investigations?

Gen. COE. I do.

Mr. SLEMP. Then, there is involved your judgment as to the political situation of the world, and the natural reaction from going

back into war after the world has been engulfed in it for five years. As a general thing, would it not be a mistaken policy to go ahead and pile up a lot of ammunition before you have made investigations and developed your types, unless you had some specific warning of danger to the national security, other than something that is purely theoretical?

Gen. COE. I agree with your statement, especially with regard to the older calibers. I think that so far as 12-inch shell production is concerned we should do no more this year, at any rate, than consider the maintenance of certain facilities in the United States. Of course, practically all of our shell production is outside of our arsenals.

Mr. SLEMP. Then you do not specifically advocate a large production of those 12-inch shells or 12-inch projectiles, of which you have a supply of some 18,000 on hand?

Gen. COE. No, sir. Also the new projects submitted cover a two-year period.

Mr. SLEMP. That is what you ask for the 14 and 16 inch guns?

Gen. COE. On the two-year program.

Mr. SLEMP. Having on hand already an accuracy-life supply for the guns that are already installed of the 14 and 16 inch types, you should only ask for a small amount of shells for those guns, as they are delivered and emplaced.

Gen. COE. That is what we are doing.

Mr. SLEMP. That is what you are asking?

Gen. COE. Yes, sir.

The CHAIRMAN. What is the largest shell you make in the arsenals of the United States?

Gen. COE. Up to 16-inch.

The CHAIRMAN. I understood you to say a minute ago that you did not make these shells in the arsenals?

Gen. COE. We have a very small capacity for shell manufacture in one arsenal.

Col. RICE. We have one very small plant.

The CHAIRMAN. What I was thinking of was what our capacity was for production of shell for the seacoast guns. In case of emergency, working three shifts per day, could we procure the necessary ammunition?

Gen. COE. I can not answer that offhand; but I will put a statement in the record covering that, if you desire.

NOTE.—A period of 12 months is estimated as necessary to put in production armor-piercing projectiles of the larger calibers, 12-inch and upward.

The CHAIRMAN. It seems to me that with the development brought about by this war we ought to have a great deal of machinery so that we could manufacture this ammunition quickly. It seems to me that it is more important to have the machinery to manufacture the ammunition than it is to have shell manufactured to-day that will become obsolete to-morrow.

Gen. COE. Yes, sir.

The CHAIRMAN. If you have the machinery and the capacity that you ought to have for the amount of money that we have expended, it seems to me that could be done.

Gen. COE. Yes, sir; I agree with that, and I think that is the reason for continuing certain shell production all the time, because you can not do that by jumps.

The CHAIRMAN. I can see how you must have a trained force that will know how to do the work when the emergency comes.

Gen. COE. And more than that, we must have the chemists and the people studying projectiles, and not simply manufacturing them. They must be studying the theory of the manufacture. There are only a few places in this country where the shells are actually manufactured, as compared with the number of places that might manufacture them if they knew the secrets of manufacture.

The CHAIRMAN. What made me bring this matter up yesterday was the fact that the board of review project for ammunition called for \$36,834,362, and you have had appropriations for ammunition, aside from tests of ammunition, etc., under this item of \$35,935,442, or within \$898,920 of the total amount of the board of review project. Now, I realize that some of that ammunition was sent to the other side to be used in naval guns that were sent over; but, according to the testimony before this committee, what you have left is practically obsolete, and yet there was not a single naval gun mounted on battleships after the board of review project that was more powerful than those mounted on battleships then afloat. It has always been the theory, if I understand the coast defense properly, that it is a progressive art, and it must keep pace with the armament that will be brought against it. If only popguns are to be brought against it, then you will only need popguns to repel them. No new improvements were brought forth, because the increase in deck armor took place long before the board of review project was adopted, and it seems to me that it is a serious indictment to estimate in times of financial stress for \$135,000,000 for ammunition and for its manufacture, when on the day we turn it out we know that it is practically obsolete. Now, it seems to me that we ought to change our policy. We ought to have the facilities to do the work and simply a skeleton organization of trained people who will keep the science in hand and be ready to turn out work, instead of piling up this vast reserve of ammunition that will become obsolete the day after it is produced.

Col. RICE. If I may say it, you doubtless know as well as I do that the manufacture of armor-piercing shell is the most difficult thing there is to do in munitions work. Even those companies that manufacture it continuously have many failures. It is a special field of manufacture, requiring special steel, and a difficult heat-treating process. The art is practically a secret, and the small variations in the heat treatment will make the projectiles fail.

The CHAIRMAN. Those are secrets known to the Ordnance Department?

Col. RICE. Yes, sir; we have them now, but before the war we did not have them, and even now, after the war, when the patriotic inducement is reduced each manufacturer will work according to his own methods, and those methods will not be known to other people. I think they will be known to the Ordnance Department. There are only four or five manufacturing concerns, including the Watertown Arsenal, that have any ability whatever in the manufacture of

armor-piercing projectiles. If we are going to be in a prepared condition, we must have not only the plant facilities and machinery, but we must also have a sufficient trained personnel to devote their time and talent to that job alone. The estimates this year will give a reasonable amount of work to the plants to which I have referred. As they are reduced, of course, the personnel employed will be reduced. Under the plan we have in mind in asking for the appropriation and spreading it out over a number of years, as now contemplated, we will keep those plants engaged at what seems to us to be a reasonable rate for maintaining what you might call intelligent organization, or a good working organization. I do not believe that it will be much more than that.

The CHAIRMAN. You use practically the same armor-piercing projectiles that are used in the Navy?

Col. RICE. They will be very much the same; yes, sir.

The CHAIRMAN. Now, if our fleet is destroyed that will be the time, of course, when your works will be called into play and you would then have available the reserve ammunition for the Navy to use in those same guns. Therefore, it seems to me that we are building up and pyramiding reserve upon reserve. Of course, you would not use those guns to any great extent until the Navy had been destroyed.

Col. RICE. Or when it is engaged at some other place.

The CHAIRMAN. That is hardly likely. The theory is that the Navy is the first line of defense for our fortifications. That is the theory.

Mr. SLEMP. Since it is developed that we have on hand the accuracy-life ammunition for the 16-inch guns that we have on hand that are emplaced, and for which it is physically possible to get the mounts on which to emplace them, and since there will be no more 16-inch guns in the next fiscal year, what is the necessity for providing \$4,327,143 for 16-inch ammunition? I will make the same analysis in regard to the item of \$1,198,750 for 14-inch gun ammunition, which is requested under similar circumstances, and also of the item of \$3,822,147 for 12-inch ammunition for replacing the armor-piercing shell, of which there are 18,000 on hand, and in regard to which you are experimenting to get a better kind. Those three items constitute the major part of the request for seacoast ammunition H.

Gen. COE. The first items are based on a two-year program for the completion of the ammunition for the 16-inch and 14-inch rifles. Now, we have also asked for emplacements or carriages as a part of the general program to be completed in two years, which involves thirteen 16-inch rifles and twelve 14-inch rifles.

Mr. SLEMP. How many 14-inch guns on railway mounts?

Col. RICE. Twelve. It will take all of two years to get that ammunition provided.

Mr. SLEMP. Will you get a part of them the first year?

Col. RICE. The allowance for these guns that we expect to have completed will be completed in two years. It will not take two years to make one shell.

Mr. SLEMP. Have you any other items?

Col. RICE. We have some items of general legislation.

ORDERS PLACED WITH ARSENALS TO BE TREATED LIKE PRIVATE CONTRACTS.

Mr. SLEMP. You have this proviso on page 54:

Provided, That all orders for manufacture of material pertaining to approved projects which are placed with arsenals or other Ordnance establishments, and which are chargeable to "Armament of fortifications" appropriations, shall be considered as obligations in all respects in the same manner as provided for similar orders placed with commercial manufacturers.

Will you state to the committee just what that means?

Col. RICE. Yes, sir. I would like to state that I am suggesting a different wording later on. That proviso was inserted with the view of making it possible for the arsenals to continue work until the money allotted for a given job had been expended. Under the present law, if we place an order with an outside contractor, it constitutes an obligation, and the money is available for a certain length of time after the end of the fiscal year, depending upon what law is applicable to it, for the payment of the obligation. If, however, we place the same order with an arsenal, that order must be completed and all of the payments must have been in condition to be made before the end of the fiscal year. It was to remedy that condition, which makes it almost impossible to manufacture, that this proviso was put into the proposed bill. This proposed legislation will afford a considerable part of the relief needed, but it is less desirable than the following language, which the Chief of Ordnance now desires to urge in substitution, namely:

Provided, That appropriations for fortifications and other works of defense, for the armament thereof, and for the procurement of heavy ordnance for trial and service made in this or any future fortification or sundry civil act shall be available for a period of two years from the beginning of the fiscal year to which the act pertains, and the fortifications act approved March 3, 1919, is hereby amended accordingly.

I have here the wording of the fortifications act of March 3, 1919, but as you are already familiar with it I will not read it.

The practical effect of this law is to require that all funds appropriated by the acts referred to must either be obligated by contract with commercial companies or paid at Ordnance establishments for services during the fiscal year to which the act pertains.

For the fiscal year 1920, this provision has been especially important, due to temporary conditions. As a result of the tremendous appropriations made for war purposes, the enormous claims and settlements resulting from war activities, and the fact that when the law was passed the total moneys required for such settlements could not be even approximately estimated, a very positive action was required to insure that we return as soon as possible to that healthy condition of careful supervision of expenditures by the Congress which war conditions rendered impracticable.

The Ordnance Department is in hearty sympathy with this supervision at all times, but it is believed that after the end of the current fiscal year such supervision can be fully exercised under the legislation now proposed, and it is thought that some leeway this year, as provided in an amendment to the Army reorganization bill recently passed by the House of Representatives, ought to be permitted. The department knows from experience that the continuation of a one-year limitation will render the procurement and manufacturing

functions of the department most difficult, uneconomical, and unsatisfactory to both management and workmen.

All the arsenal commanders have been consulted and asked to suggest plans to meet the difficulties with the least disturbance and the greatest economy. All are gravely concerned over the situation. Various delegations and other representatives of the workmen have been to see me on the subject, and I expect more as the end of the year approaches and the conditions are better understood.

The practical difficulties encountered in the application of the one-year limitation are as follows:

(a) It has happened not infrequently that appropriations have been passed by the Congress and approved by the Executive after July 1 of the fiscal year to which they pertain. In such case the arsenals would be totally without funds, and all employees would have to be furloughed or discharged. Even if a joint resolution were passed toward the end of June, the situation would be most serious, in that there would not be time in which to make the necessary arrangements for proceeding with the work. In addition, the force would, of course, be badly disorganized, as every man who could obtain a position elsewhere would do so.

The estimates are prepared about nine months before the beginning of the fiscal year to which they pertain, and the hearings are usually held from four to six months in advance of that date. Estimates of dates of completion will frequently be too short, with the result in some cases that work held necessary by the Congress will be left partially completed and must so remain for at least a year until new appropriations can be made. I expect that condition to arise this year.

(b) Under this provision of law a continuous flow of work at the arsenals is not practicable, nor is it possible for the management to give the employees information as to the work ahead a sufficient length of time in advance of the end of the fiscal year so that they will have any feeling of security as to the length of their employment. Unless we take the chance that work may be left on June 30 partially complete, it will be necessary to begin months ahead of that time to begin laying off men who will have completed the earlier portions of jobs, and immediately after the new appropriation has become available reemployment and a new start will be necessary. It is essential for good business management that reasonable continuity of work be maintained, that the changes should not be sudden, and that the employees know at least some months in advance as to what is ahead in the way of employment.

(c) But a small part of the articles produced under the fortifications bill can be completed within a year after the money becomes available, even if a start is made as soon as is permissible, which, of course, can not be done with all the articles appropriated for. It requires several weeks to do the planning, preparing the job cards, etc., and from one to several months to get a fair accumulation of material upon which to work. It must consequently be expected that in the majority of cases completion will not be had during the fiscal year. The act of Congress approved March 3, 1809, which has since been several times amended, but without changing its main provision, prohibits officers of the Government incurring obligations

in advance of appropriations therefor, and one of the amendments provides fine or imprisonment, or both, as a penalty. While this law does not directly forbid undertaking manufacture at arsenals of articles which it is known can not be completed with the funds that are appropriated, it is considered to be of questionable legality to thus create a situation in which either the appropriations for completion must be made by the Congress or the amount used must be lost by the Government. Yet under the existing law this action will be necessary if anything is to be accomplished.

(d) An alternative to the action discussed in the preceding sub-head would be to proceed as far as possible with manufacture at the arsenals and then toward the end of the year make contracts for the completion of the work, which would enable the use of the money for the purpose for which it was appropriated. Such an alternative is so undesirable and uneconomical and in some cases so impracticable that it must be dismissed from serious consideration.

(e) In the class of work done by the Ordnance Department, particularly in its development efforts, it is unavoidable that delays will occur which could not have been foreseen and which prevent beginning operations as soon as had been expected. Such delays are of entirely reasonable character and may make it undesirable to undertake the work with the expiration of the money within sight at the end of a few months, and therefore may entirely defeat the object of the appropriation or force work by contract that should be done at an arsenal.

(f) The system of arsenal administration authorized by the act approved March 4, 1911, makes it necessary that a stock be maintained from which purchase may be made of raw materials and articles of common use for manufacture under any given allotment. The moneys so obtained are credited to the stock fund and new purchases are made from time to time as required. Under the system of one-year appropriations it would be necessary to close out this stock fund and turn in the money each year and start again with money from the new appropriations. This will create real difficulties in the way of accounting and in delays, and will inevitably cause a tendency to make large purchases for the stock account toward the end of the year, which is both uneconomical and undesirable.

(g) What we call "shop expense" is the overhead item in arsenal accounts from which indirect labor and materials, leaves of absence, holidays with pay, etc., are paid. This shop expense account is formed and maintained by charging a percentage of the direct labor and machine hour costs to each order, which percentage is determined by experience, and crediting the shop-expense account.

By law, leaves of absence may not be granted until after a year of service, which results in the employees being entitled during the second year to 60 days, which must properly be paid from the shop-expense fund accumulated during the period of their service. This requirement as to payment holds true in regard to all leave, but involves the largest amount in the case cited. It has been customary at the arsenals to shut down during the early part of July for stock taking, overhauling, etc., and to give the employees annual leave. In order that the shop percentage for different months may not be irregular, and the computed costs of the same articles under the same conditions be widely variant, it is necessary to accumulate

throughout the year the money for the purpose of paying these leaves. Under the present law it will be necessary to shut down in June in order to pay as large a share of these leaves as possible from applicable funds. This is, however, the time of the year of greatest activity and of the greatest necessity for proceeding with the work, closing out the yearly accounts, etc., and the employees have objected to the suggestion that this period be used. Furthermore, many of the leaves which have been accumulating during the year can not be granted until the next fiscal year, which would in effect be discharging obligations from appropriations which had not been made when the obligations were incurred, which is illegal. It would, of course, be necessary that all the money in the shop-expense fund be expended by June 30 or revert to the Treasury, and that a new fund be immediately created from the new appropriations, which is difficult in application and inequitable in determining costs.

(h) The difficulties explained above result in the general feeling among the workmen that their jobs are uncertain and likely to be of short tenure, a condition which is undesirable in any manufacturing plant, and which would be fatal to a commercial concern. It means excessive turnover in labor and the employment of necessarily less skilled and more undesirable workmen, as the better class will naturally seek and will be able to secure positions where they may feel that their employment is more stable.

(i) One of the most serious consequences of a one-year limitation is the increased cost of production. This will inevitably result from the dissatisfaction of the workmen, the large turnover of labor, lack of continuity in the flow of work, a yearly change in orders, shop expense account and stock fund account, the possible furlough of entire arsenal forces should the passage of appropriation bills be delayed beyond the time when active operations may be started by the first of the fiscal year, and possible uneconomical purchase by contract.

The two-year limit is more desirable than the other proposed legislation, as the former makes practicable a better and more orderly procedure with the same general result.

The two-year allowance is necessary to render effective the intent of the Congress that certain articles shall be procured, as evidenced by making the appropriation. For the particular class of material covered by the fortifications acts, one year is not sufficient for carrying out this intention. Two years, while not always covering the entire life of the job, would produce a situation in which the greater difficulties could be overcome.

Mr. BYRNS. As I understand, the law as now written or as written in the last fortification bill, it really amounts to a two-year appropriation, provided obligations are made during the first fiscal year.

Col. RICE. Yes, sir; the main difficulty with the law, so far as it applies to the arsenals, is that we can not, under present existing law, create an obligation except by buying, by contract, material to be used in the arsenal or actually having the work performed during the year.

Mr. BYRNS. Now, your main difficulty in that respect lies in the uncertainty as to whether or not the fortification bill will be passed in sufficient time before the expiration of the fiscal year.

Col. RICE. That is only one of the difficulties, sir.

Mr. BYRNS. Is not that the main one, because I think it could be safely assumed that any work undertaken in pursuance of authority from Congress in the arsenal would be carried on to completion by Congress with reference to the additional appropriations necessary during the next fiscal year?

Col. RICE. For the orderly procedure in the manufacture of the arsenals, I should say we would have to know at least four months in advance as to what the appropriations are for the next year. We have to have some sort of a certainty. We know what the orders are on hand; we can make an estimate as to how soon they are going to be completed, and which ones of them are going over, but nearly always there will be some that do have to go over whether under new appropriations or old, or else be stopped.

Mr. BYRNS. Would not your real difficulty be relieved if this language as originally submitted were adopted, permitting these contracts made with arsenals to be considered as obligations during the next fiscal year?

Col. RICE. That would be a very considerable help. The language as carried in the Army reorganization bill, if enacted in an appropriation bill which we may be sure will pass, would be a considerable relief to the Ordnance. It does not help the Signal Corps or the Engineers. It is not as desirable a form, in our opinion, as the other, and it has essentially the same effect, because under it, if we place orders at the arsenal, they then become obligations, and we therefore can carry them through until the end of the following year, just as we could under this provision.

Mr. SLEMP. Now, another point you mentioned was about holding back from each project a certain sum of money for payment of men during their holiday periods.

Col. RICE. Yes, sir.

Mr. SLEMP. How is that affected one way or the other?

Col. RICE. It affects the business administration very badly.

Mr. SLEMP. You charge that up in either case?

Col. RICE. Yes; but in order to get a reasonable cost determination we have to spread the cost over the period during which it entitles the man to his leave, and you can not do that unless you charge it against the order.

Mr. SLEMP. That would be all right in either case?

Col. RICE. No, sir; because our money would expire.

Mr. SLEMP. If you are sure that Congress will function on this bill along about the 1st of March every year, then in what way is your competitive relation between the arsenals and outside contractors affected by this legislation, one way or the other?

Col. RICE. If we make that assumption?

Mr. SLEMP. Yes.

Col. RICE. I do not think it would be affected at all.

Mr. SLEMP. We acquainted ourselves the other day with the record of the passage of the fortification bill for the last 20 years.

Col. GATCHELL. There were several cases in recent years where it was passed in June, which is hopeless for us, because by the time we go through the Treasury Department and through the various details necessary before that money actually gets to the arsenal it means that we would have to discharge or furlough our men.

Col. RICE. And within my experience there have been cases where appropriations were not made until after the 1st of July, and one such instance would ruin us.

The CHAIRMAN. That does not involve contracts for material?

Col. RICE. No, sir.

Maj. BROWN. Mr. Chairman, may I say a word in connection with this matter? The other day while discussing this same question Col. Sherrill, of the Engineers, referred to delays in handling allotments in the office of the Director of Finance. It appears to be only fair to say in this connection that a few months ago it became apparent that some obligations were being incurred by certain operating services in excess of the amounts apportioned to them, and in order to avoid the creation of a deficiency it was accordingly necessary for instructions to be issued that before allotments could be made a certificate be secured from the Director of Finance that funds were available from the proper appropriation, otherwise a deficiency would have been necessary. In any case there is nothing in this regulation which would interfere with the operation of the Engineer Department in proceeding as soon as funds actually become available with its work, so that the difficulty in connection with this legislation does not at all lie in any delays, if indeed there are any delays, for which the Director of Finance can be blamed. I am satisfied that this is simply one of the problems which the Director of Finance has to handle. It is being handled and it is being solved, and it is going to be solved to the satisfaction of all services.

I might add, from my number of years' experience in the Engineer Department, which I have had personally, this legislation, I know, will lead to considerable embarrassment in the accomplishment of its work, particularly from the fact that their projects, in a sense, are unique. They cover, in some cases, large amounts of technical work which have to be done by hired men and not by contract, and the close of the fiscal year puts a stop upon the availability of the funds right in the height of the working season. It might be pertinent to cite the dates when these fortification appropriations have become available:

The first one, September 22, 1888; August 1, 1890; July 23, 1892; August 18, 1894; June 6, 1896; May 7, 1898; May 25, 1900; June 6, 1902, April 21, 1904; May 27, 1908; June 6, 1910; June 25, 1906; May 27, 1908; June 23, 1910; June 6, 1912; June 27, 1914; July 6, 1916; and July 8, 1918. In many cases either after the beginning of the fiscal year or very close to the end of the preceding fiscal year, and it presents a very difficult administrative proposition to get the funds out into the 30 or more districts and get the forces to work or to see that their work is not discontinued through lack of funds.

Mr. SLEMP. Could you do that with the legislation suggested by the Chief of Coast Artillery, making it available for two years?

Maj. BROWN. That would obviate the greater part of the difficulties.

PERFORMANCE OF WORK BY ONE GOVERNMENT DEPARTMENT FOR ANOTHER.

Col. RICE. Mr. Chairman. I would like to suggest, if I may, a provision, of which I gave you a copy yesterday and which has come

up very recently, as an item which we had to consider, which reads like this:

Provided, That whenever any Government bureau or department procures by purchase or manufacture, stores or materials of any kind, or performs any service for another bureau or department, the funds of the bureau or department for which the stores or materials are to be procured or the service performed, may be placed subject to the requisitions of the bureau or department making the procurement or performing the service for direct expenditure, and further: *Provided*, That funds so placed with the procuring bureau shall remain available for a period of two years for the purposes for which the allocation was made unless sooner expended.

I will say, in explanation, that except for a provision as to the money remaining available for two years, that is the law as it now exists between the Navy Department and the War Department. It does not exist between the War Department and any other department of the Government except the Navy Department, with the result that when the Post Office Department, for instance, places orders with us for manufacture, in view of the fact that their law does not contemplate manufacture, but only contemplates purchase, they can only pay us when the goods are completed. Now, there is a law which allows the Ordnance Department to use its current balances for work for other departments of the Government. Therefore, we are confronted with a situation by which the only way we can do the work for any other department but the War Department or the Navy Department is by allotting funds appropriated for another purpose; if we have no available funds to allot or if we are not willing to allot for the work in that way, we can not do the work.

Mr. SLEMP. Are you referring to arsenals?

Col. RICE. Yes, sir; wholly to arsenals. And if it should happen that work for the outside departments was greater than that for the Ordnance Department itself, we would be unable to do this work. All we want to do is to secure permission for other branches of the Government, other than the Navy Department or the War Department, to transfer funds to us to perform the work for them.

The CHAIRMAN. Instead of having it available for two years, when the order is given, why shouldn't they pay the contract price to the Ordnance Department, in order that you could use the particular funds that had been appropriated for that very thing; in order that the War Department could use the funds for that particular thing?

Col. RICE. That is exactly what the law does not permit now. Under the ruling of the comptroller, the only way they can pay is to pay when delivery is made.

The CHAIRMAN. Then, you have got to use another fund not intended for that purpose to do a service for the other departments, when the other department has an appropriation for that very thing?

Col. RICE. That is the evil we want to correct.

The CHAIRMAN. It seems to me the way to correct it is to have a transfer of the funds made, to transfer the funds when the order is given.

Col. RICE. That is what this provides for, sir.

Mr. SLEMP. The desirability of this, as I understand it, is further accentuated by your wish to utilize the arsenals so far as you can in producing things for the Government, so that this organization that you have got there that would be very useful in emergencies

and war times shall be at hand and not be dissipated any more than is actually necessary, and you might actually do away with many of the war activities there and engage these same men in the production of other than war materials, and then over night, in case of emergency, they could abandon the peace-time work and take up the war work again; is that the idea?

Col. RICE. Our general idea is that we should maintain on munitions work a skeleton organization, at least, which would keep them more or less trained in that work. But in addition to that we want a force, even though a small one, but a force that we may use for other work, and this legislation facilitates that procedure.

Mr. SLEMP. The Army organization bill favored this policy?

Col. RICE. In general; yes, sir.

Mr. SLEMP. I wish you would put in the number of men employed at six arsenals, beginning with 1914 and up to date, respectively, at Watervliet, Springfield, Watertown, Picatinny, Frankford, and Rock Island.

(The statement referred to above is as follows:)

Statement regarding number of men employed at arsenals each year from 1914 to the present date.

Arsenal.	1914	1915	1916	1917	1918	1919	1920
Frankford.....	1,916	2,488	2,001	3,243	4,972	3,936	2,372
Picatinny.....	457	317	373	730	1,216	471	807
Springfield.....	692	557	1,288	4,531	4,252	2,883	2,711
Rock Island.....	1,627-1,993	2,054-2,012	1,814-1,921	3,052-4,876	7,246-10,384	9,125-7,400	7,857
Watertown.....	645- 662	600- 676	610- 615	709-1,246	1,973- 3,018	4,581-3,553	2,937
Watervliet.....	497	650- 424	407- 422	449- 670	1,441- 3,361	3,987-4,406	2,662

SPECIAL CIVILIAN SERVICES, OFFICE OF CHIEF OF ORDNANCE.

Col. RICE. There is a provision on page 89 that I would like to take up.

Mr. SLEMP. This provision:

Provided, That the Chief of Ordnance of the United States Army is authorized to employ in the District of Columbia, out of the appropriations made in this act for designing, procuring, caring for, and supplying ordnance and ordnance stores to the Army, such services, other than clerical, as are necessary for carrying out these purposes.

Col. RICE. That provision, while it is new in this particular fortification bill, is one that was passed in the early part of the war in a deficiency bill by this committee. In the last two years it was carried without comment in the Army bill. It was inserted in this bill, and I think it proper that it should be taken up with this committee rather than the Army Committee under the existing conditions where the reducing of personnel is in process, because this committee handles the legislative, executive, and judicial appropriations. The provision, as you will note, is for other than clerical work, and has to do with the employment of people who are on other classes of work, some of which are very important, and will be in the future very important.

We can get along with a good many less than we have now, and a good many less than we had in the war, but it is quite important

that we have some of them retained. For instance, as an illustration, the matter we have just been talking about. In order to handle the business of securing orders from other Government departments and placing them with the arsenals, doing that class of work, we must have what we call sales engineers, men of the engineer class, and who know the arsenal equipment and who can analyze bids and drawings and that sort of work. They would come in this classification. There are certain classes of people who would come under the designing work also who would probably come under this. I am going to ask Col. Gatchell to give you the details in regard to it, if I may, Mr. Chairman.

Col. GATCHELL. Now, in order to provide for that class of employees doing other than clerical work and which can not be secured for a salary of \$1,800, we have at present a fifth roll known as the District of Columbia nonclerical roll.

Authority for the so-called District of Columbia nonclerical roll was first given in the urgent deficiency appropriation act, approved June 15, 1917, in response to a letter from the Chief of Ordnance, as follows:

OFFICE OF THE CHIEF OF ORDNANCE,
Washington, April 20, 1917.

Hon. J. J. FITZGERALD,

Chairman Committee on Appropriations, House of Representatives.

DEAR MR. FITZGERALD: In accordance with your suggestion, and as a part of my recent hearings before your committee upon the emergency deficiency estimates for carrying on the war, I suggest legislation something like the following, for the purpose of relieving this department from certain restrictions of existing law which the appropriation alone of funds will not suffice for:

In carrying out the purposes of the appropriations made for designing, procuring, caring for, and supplying to the service ordnance and ordnance stores, the Chief of Ordnance is authorized to employ in the District of Columbia such services, not clerical, as are necessary for carrying out these purposes.

A measure of relief along this line has been afforded by legislation carried in the legislative, executive, and judicial appropriation act passed at the last session of Congress, but it is limited in extent, and applies only to certain kinds of appropriations.

Sincerely, yours,

WILLIAM CROZIER,
Brigadier General, Chief of Ordnance, United States Army.

The language of the legislation carried in the act differs slightly from that suggested in the letter of the Chief of Ordnance before quoted, and is as follows:

The Chief of Ordnance of the United States Army is authorized to employ in the District of Columbia, out of the appropriations made in this act for designing, procuring, caring for, and supplying ordnance and ordnance stores to the Army, such services, other than clerical, as are necessary for carrying out these purposes.

This legislation was repeated in the urgent deficiency appropriation act approved October 6, 1917, and in the Army appropriation acts approved July 9, 1918, and July 11, 1919, respectively.

It should be noted that the authority conveyed by the legislation above quoted does not require the appropriation of any additional funds; it merely makes available for carrying out the specific objects of appropriation funds already appropriated.

The persons employed under this authority and carried on the District of Columbia nonclerical roll could not be obtained under the limitations pertaining to other rolls with respect to compensation.

The roll never was a very large one; the maximum number of persons employed under this authorization was 900, this at the time when the Ordnance civilian personnel in Washington numbered 8,500.

On March 15, 1920, there were carried on the District of Columbia nonclerical roll:

1 employee at -----	\$5, 000
5 employees at from \$4,000 to-----	4, 500
9 employees at from \$3,000 to-----	3, 500
11 employees at from \$2,500 to-----	2, 900
49 employees at from \$2,000 to-----	2, 400
42 employees at less than-----	2, 000

117

3 special, per diem, under personal-service contracts.

120

On lines 10 to 17 of page 74 of the legislative bill, as presented in the House, prohibition is made against the payment of civilian personnel in the bureaus or offices of the War Department in the District of Columbia in any other act for the fiscal year 1921. With two exceptions, also in lines 18 to 20, a salary limit of \$1,800 is placed upon persons on the additional roll. These two provisos would make it impossible to use funds in other acts for the payment of salaries to such employees as senior cost accountants, mechanical engineers, ordnance engineers, sales engineers, ballisticians, and mathematical experts, who have heretofore been carried on the District of Columbia nonclerical roll. It is vital to the proper functioning of the Ordnance Department to hire such people.

It can not be too often or too forcibly stated that the Ordnance Department is a technical department and that in our country its activities do not find any parallels in the ordinary industrial life of the Nation. The Government does not lend its assistance to the maker of the 6-inch, 12-inch, 14-inch guns and mounts, to the makers of powders and high explosives, to the makers of machine guns, machine-gun ammunition, etc. It is vital to the Nation not only that knowledge of these things be kept alive, but that progress be made continuously in their development. The mechanical engineers, ordnance engineers, ballisticians, mathematical experts, etc., who are all carried on the District of Columbia nonclerical roll must be employed in addition to the regular officers of the Ordnance Department if the Ordnance Department is going to exist as a competent, vigorous, and up-to-date branch of the War Department. It is foolish to expect or to hope to obtain experts of the ability necessary for the meager salary of \$1,800.

Thus, in our opinion the additional roll must be supplemented by the District of Columbia nonclerical roll.

It is estimated that for this year the total amount to be expended on this roll will be approximately \$260,000. We estimate that for next year, for the class of employees engaged on nonclerical work and of a type which can not be obtained for \$1,800 per year, we will require about \$142,900.

To sum up, what we desire is that this proviso be retained in the act with the following amendment: After the word "purposes" strike out the period, insert a comma, and add the words "and the

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Col. GATCHELL. My understanding is that the legislative bill had been passed at that time, which provided for this allotment roll, but at the outbreak of the war it immediately became necessary to have a great many more of this class of people, and that is the reason this proviso was put in. That was the first step. As Gen. Rice has outlined, the distinction has grown up between the allotment roll, which is used almost entirely for the designers, and this personnel roll.

Mr. SLEMP. Are these civilian employees?

Col. GATCHELL. Yes; on the technical staff, for instance, we have expert ballisticians, and computers, and mathematical work that you can not get done for \$1,800 a year, and yet they are not connected directly with the design and manufacturing work.

Mr. SLEMP. Would this \$142,000 that you propose spending next year be in addition to the \$400,000 mentioned in the legislative, executive, and judicial bill, or a part of that?

Col. GATCHELL. It would be additional.

Mr. SLEMP. The effect of this would be to increase this allowance to \$542,000?

Col. GATCHELL. Yes, sir; it does not in any way change our appropriation, but it increases the amount that we can spend for nonclerical employees in Washington.

Mr. BYRNS. That is just the difficulty that occurs to me. Now, one subcommittee having charge of the legislative, executive, and judicial appropriation—

Col. GATCHELL (interposing). That is the reason we put it in this bill.

Mr. BYRNS. I understand but it is also in this bill, and if you have two funds from which you draw for the same purpose—it seems to me it ought to be confined to one provision or authority. In other words, this provision is broad enough to provide for draftsmen, or any other employees provided in the legislative, executive, and judicial bill, and yet you have done exactly the same thing here that you have done in the legislative, executive, and judicial bill.

Col. RICE. That is true; as I said a moment ago, we are trying to keep the allotment roll out of this thing of clerical work.

Mr. BYRNS. I catch the idea.

Col. RICE. There has always been a great deal of criticism, and undoubtedly somewhat justifiable, of the overemployment of clerical people in Washington, and we are trying to hold ourselves away from the clerical personnel and confine it to the nonclerical, and we want to maintain that condition if we can.

Mr. SLEMP. Now, Colonel, there has been quite a large increase in the amount of the legislative, executive, and judicial bill for this purpose. In 1916 that bill carried for this same item \$140,000.

Col. GATCHELL. Yes; there is a large increase in the amount of experimental work that is being carried on under the Westervelt Board; our estimates were \$660,000 for that roll.

Col. RICE. In addition to that, in 1916 there was a lot of designing work which could have been more economically done in Washington which was done outside of Washington, so the money was spent anyway.

Mr. SLEMP. I don't quite get the theory on which you refer to the Westervelt Board having been accepted by any legislative body. Not a dollar has been appropriated in regard to it.

Col. RICE. I am very glad you brought that up, Mr. Slemp. I think there has been some misunderstanding on the subject. The Westervelt Board made recommendations to the War Department as to what it thought was the best thing to do in regard to certain features of the military program. The War Department approved that expression of opinion, and their approval amounts only to this, that in so far as the funds appropriated by Congress will permit, that is the line on which the work will be done.

Mr. SLEMP. Consistent with the statements made before the Appropriations Committee.

Col. RICE. So far as practicable; yes, sir.

Mr. SLEMP. But it does not mean that everything that the Westervelt Board has favored is to be appropriated for now or at any other time. If we went into the making of everything in the Westervelt report; if we equipped our Army with everything carried in that report——

Col. RICE (interposing). It would be hundreds of millions.

Mr. SLEMP. If we equipped ourselves in accordance with the policy outlined in the Westervelt report it would be billions of dollars. What you have done is to recommend certain types for development and experimental purposes?

Col. RICE. That is all.

Mr. SLEMP. And when I mentioned it, I mentioned it in accordance with the whole big program.

Col. RICE. The Westervelt report itself does not contemplate that these things should be manufactured in quantity until there is an emergency.

Mr. SLEMP. Now, you don't have any men for the purpose of procuring stores like you had during the war, when you had a great big department; you have eliminated that, haven't you?

Col. RICE. No, sir; we have no procurement division, as we did before, but have certain functions in connection with the procurement business. We procure a good deal for other departments, and have some active functions for the Ordnance in that line.

Mr. SLEMP. How many men have you for that?

Col. RICE. I can not give you that——

Mr. SLEMP (interposing). Is the number small?

Col. RICE. Yes, sir.

Mr. SLEMP. And the caring for stores should be a maintenance item?

Col. RICE. There are certain requirements; for instance, men of special training that have to be available in order to supervise that work and carry it on are in Washington, and not outside of Washington.

Mr. SLEMP. The main feature is the designing; is that the idea?

Col. RICE. Of the \$400,000, it is practically all designing; but this particular thing is outside of designing.

Mr. SLEMP. If it is not allowed, you would take the money out of the \$400,000?

Col. RICE. We would probably not; if it is not allowed we shall probably have to get along without it, if we can. There are perhaps

a very small number in the technical staff, for instance, that we would have to retain in connection with designing work, but the policy of the Chief of Ordnance is not to put anybody on the allotment roll that is not connected with the designing work.

Mr. SLEMP. And the reason for that, too, is that you want permanency in the personnel, and not be subject to the shifting orders of the department?

Col. RICE. That is a part of it, and another thing is, as I say, there is always constant tendency among the heads of the divisions to increase the clerical force and the legislative-act fund should not be used for that, and it is not so intended.

Mr. SLEMP. Have you any other items in this bill?

Col. RICE. No, sir.

SATURDAY, MARCH 27, 1920.

STATEMENTS OF MAJ. GEN. CHARLES T. MENOHER, DIRECTOR OF AIR SERVICE; BRIG. GEN. WILLIAM MITCHELL, DIRECTOR OF MILITARY AERONAUTICS; COL. A. L. FULLER, AND LIEUT. COL. J. E. FICKEL.

AIR SERVICE—INSULAR POSSESSIONS.

**PURCHASE, MANUFACTURE, MAINTENANCE, OPERATION OF AIRCRAFT, ETC.,
PHILIPPINE AND HAWAIIAN ISLANDS.**

Mr. SLEMP (reading):

For the purchase, manufacture, maintenance, operation, and repair of airships and other aerial machines, buildings for equipment, and other accessories necessary in the Air Service for use in connection with the seacoast defenses in the following localities: Philippine Islands, \$100; Hawaiian Islands, \$100.

This is just a formal estimate for the purpose of preserving the language.

Gen. MENOHER. Yes, sir.

Mr. SLEMP. What is the state of your balances; how much have you on hand and what have you expended this year?

Col. FICKEL. The present free balance is \$68,265.78 for the Philippines, and for Hawaii the present free balance is \$15,968.96.

CURRENT YEAR EXPENDITURES.

Mr. SLEMP. How much money have you expended this year under this item?

Col. FICKEL. I have not the dates that these expenditures were made, but practically all the expenditures that were made in those two places have been made this year.

Mr. SLEMP. You do not purchase any airships or buildings out of this appropriation? Is this just a maintenance item?

Col. FICKEL. No, sir; we have purchases also. It has been used chiefly for construction but there is an item of leak-proof gasoline tanks amounting to \$80,272.58, which were purchased to improve the DH-4s which were sent over to the Philippine Islands to make them more fit for battle use. There was an item of \$23,368.04 which was

placed in one order for miscellaneous tools and equipment for the seacoast defenses in the Philippine Islands.

Mr. SLEMP. You mean the seacoast aerial defenses?

Col. FICKEL. Yes, sir; that is in the Philippines. In Hawaii, in 1917, there was one order for equipment of \$34,281.72 for sea sleds to be used there. There has been this year in Hawaii an item of \$51,190.94 for machinery, tools, engine parts, and spares at Hawaii.

GENERAL STATEMENT.

Gen. MENOHER. Mr. Chairman, if I may submit a general statement, I think it will clear up many things and we will get off on the right foot, so to speak.

While the matter is fresh in the minds of the committee I would like to invite the attention of the committee to our interest in the matter Gen. Rice brought up about the transfer of funds to the producing agency. That is the matter on which he submitted to you a proposed amendment which would permit other departments of the Government to transfer funds promptly to cover the cost of services or supplies supplied by one department to the other. He had a proposed provision here and we are interested in that. As between the Army and the Navy that is covered by law, but, for example, there is the Post Office Department or the Agricultural Department or any of the other departments, and we are interested in that to the same extent, and I thought I would invite attention to it while it was fresh in the minds of the committee.

I have here a general statement which I would like to read with the permission of the committee. It has to do with the situation in so far as the Air Service is concerned. In the general scheme of coast defense Air Service activities at the following places are concerned:

DETAIL OF ESTIMATES.

- 1. Air Service activities at the following places are concerned:

AERIAL COAST DEFENSES.

- Continental United States: Continuation of funds heretofore appropriated.
- Panama Canal: Continuation of funds heretofore appropriated and new appropriation.
- Island of Oahu: Continuation of funds heretofore appropriated and new appropriation.
- Philippine Islands: Continuation of funds heretofore appropriated.

Continental United States.

[No new appropriation is asked.]

	Former ap- propriation.	Obligation.	Reservation.	Free bal- ance.
Aviation, seacoast defense.....	\$3,600,000.00	\$894,779.14	\$20.00	\$2,705,200.86
Aviation stations, seacoast defense.....	8,000,000.00	1,088,041.48	2,906,750.00	4,005,208.52
Total.....	11,600,000.00	1,982,820.62	2,906,770.00	6,710,409.38

Appropriation less obligation, \$9,617,179.38.

Proposed expenditures.

Construction of one balloon base line on land to be purchased on coast defenses of Narragansett Bay:

Sachuest Neck-----	\$304,600.00
Fort Kearney-----	63,000.00

\$367,600.00

Construction of five heavier-than-air stations in coast defenses of (on land to be purchased):

Long Island Sound-----	\$1,217,282.50
Narragansett Bay-----	1,162,010.50
Boston-----	1,158,482.50
Portland, Me-----	1,134,472.50
Puget Sound-----	1,062,202.40

5,734,450.40

Purchase of seven parcels of land, as follows, in coast defenses of:

Long Island Sound, Stonington, Conn.. 100 acres-----	\$27,500.00
Narragansett Bay (3)-----	69,000.00
Boston Harbor-----	351,475.00
Portland-----	88,750.00
Puget Sound-----	60,000.00

596,725.00

Contingencies-----	11,633.98
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Grand total-----	6,710,409.38
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In the continental United States we are asking for a continuation of funds heretofore appropriated; no new appropriation.

For the Panama Canal a continuation of funds heretofore appropriated and a new appropriation.

For the island of Oahu continuation of funds heretofore appropriated and a new appropriation.

For the Philippine Islands a continuation of funds heretofore appropriated and no new appropriation.

There was appropriated in 1917 for aviation, seacoast defense, \$3,600,000, and there remains a free balance of that amounting to \$2,705,200.86. In 1918 there was appropriated for aviation stations, seacoast defense, \$8,000,000, making a total appropriation for the two of \$11,600,000. Of this \$8,000,000 for the Air Service, aviation stations, seacoast defense, there remains a free balance of \$4,005,208.52, or out of the total appropriation for those two years for aviation, seacoast defense, of \$11,600,000, there remains a free balance of \$6,710,409.38. There have been certain reservations in that. The appropriation as it stands now, less all obligations and reservations, is \$9,617,179.38 and the difference between that reservation and the obligation as it appears here can be covered in detail later.

The proposed expenditures are these:

We propose to expend for the construction of one balloon base line on land to be purchased by the Government, which is a proposition up at Narragansett Bay, and requires the purchase of two small parcels of land, amounting to \$367,600.

Then to construct five heavier-than-air stations, one at Portland, Me., one at Boston, one at Narragansett Bay, one at the eastern entrance to Long Island Sound, and one at Puget Sound, the total is \$5,734,450.40.

Then to purchase seven parcels of land for the construction of these various stations at these same places, one at Portland, one at Boston Harbor, one at the eastern entrance to Long Island Sound, three parcels at Narragansett Bay, and one at Puget Sound, the total

of all the foregoing plus contingencies is \$6,710,409.38 or the same amount as the free balance.

The appropriation of \$3,600,000 made in 1917 is available for the purchase of equipment and construction in connection with the establishment of stations, except for the construction of barracks and quarters. The appropriation of \$8,000,000 made in 1918 is available for the establishment of the eight stations which have already been laid out, and, as I understand, the whole project has been approved.

Mr. SLEMP. Does that include barracks and quarters?

PURCHASE OF LAND.

Gen. MENOHER. Yes, sir. Actual construction on the major portion of these projects had to be postponed on account of the fact that the Army appropriation act approved July 9, 1919, prohibited the expenditure of funds on hand for the purchase of land, notwithstanding the fact that Congress had specifically given authority for the purchase of land for these stations.

Mr. SLEMP. They gave that, though, General, with the restriction that wherever possible these stations should be put on land already owned by the Government, and that no new land should be acquired except with the actual approval of the Secretary of War.

Gen. MENOHER. That is correct; and all these so-called lighter-than-air stations mentioned in here—the balloon base lines—except one, are on Government-owned land. The one for which new land is required is the balloon base line at Narragansett Bay. We wish to purchase a small tract of land at Sachuset Neck and on the western shore of Narragansett Bay near Fort Kearney, and they are the only ones that are on land to be purchased, the only ones of the lighter-than-air stations.

Hence the necessity for continuation of the appropriation and the authority to purchase land which is now being sought. That is the whole object of our hearing. The project on which these funds have been obligated, reserved, or on which it is proposed to apply the free balances, have not been hastily prepared; but, on the contrary, are the result of a definite and careful study made by the Army and Navy prior to the war for the purpose of carrying into effect the functions of coastal air service assigned to the Army in the report of the joint Army and Navy board dated March 12, 1917, and as redefined and reapproved by the joint board January 22, 1920. These projects have had the definite sanction of Congress, as indicated by appropriations made therefor in 1917 and 1918.

Mr. SLEMP. Are you referring now to the heavier-than-air stations or to the lighter-than-air stations, or to both?

Gen. MENOHER. I am referring now really to the appropriations by Congress in 1917 and 1918, the two I referred to.

These projects have had the definite sanction of Congress, as indicated by appropriations made therefor in 1917 and 1918, pursuant to estimates presented to Congress and extended hearings had thereon. Gen. Jervay, director of operations, made the statement, April 15, 1919, and the Secretary of War approved the same, as follows:

The establishment of certain air coast-defense stations was not a temporary measure to meet German submarine operations in the United States.

He made that statement, as I understand, in the hearings.

Col. FULLER. No, sir.

Gen. MENOHER. It was not made in the hearings.

COASTAL AIR STATIONS—RELATIONSHIP TO COAST-DEFENSE PLANS.

This indicated further that these coastal air stations are a part of the permanent coast-defense plan, carefully drawn as a permanent part of the Army and Navy plans for the defense of the coasts.

The functions of the Army part of these plans as to air services are:

Operation from bases on shore—

- (1) As an arm of the mobile Army.
- (2) Against enemy aircraft in defense of all shore establishments.
- (3) Alone or in cooperation with other arms of the Army or with the Navy against enemy vessels engaged in attacks on the coast such as—
 - (a) Bombardment of the coasts.
 - (b) Operations preparatory to or of landing troops.
 - (c) Operations such as mine laying or attack on shipping in the vicinity of defended ports.

Mr. SLEMP. And reconnaissance?

Gen. MENOHER. Yes. I am quoting here from the decision of the Joint Army and Navy Board as to the functions of the Army in the matter of coast defense. The word "reconnaissance" does not happen to appear in that quotation, but, of course, that is one of the prime functions. There is no question about that.

Pursuant to the policy stated above, the Secretary of War approved the following projects for the continental United States August 15, 1917, and stated:

"The number of aero squadrons and balloon squadrons enumerated * * * are deemed to be a conservative estimate of the probable need of the United States for coast-defense aeronautical equipment.

	Project approved Aug. 15, 1917.		Proposed from funds heretofore appropriated.	
	Aero squadron.	Balloon base, line 2 cos. each.	Aero squadron.	Balloon base, line 2 cos. each.
Portland, Me., or vicinity.....	1	1	1	1
Boston or vicinity.....	2	2	1	1
Narragansett Bay or vicinity.....	1	1	1	1
Long Island Sound.....	1	2	1	1
New York City or vicinity.....	2	2	1	1
Delaware.....	1	1		
Chesapeake.....	1	3	1	1
Key West.....		1		
Pensacola.....		1		
Galveston.....		1		
San Diego.....	1			
Los Angeles.....		1		
San Francisco.....	2	1	1	1
Columbia River.....	1	1		
Puget Sound.....	2	1	1	1
Charleston.....	1	1		
Total approved project.....	16	20	8	8
Proposed from funds on hand.....	8	8		
For future consideration.....	8	12		

It is proposed to put aviation at this time at Portland, Me., Boston, Narragansett Bay, Long Island Sound, New York City, Narragansett, southern New York, Langley, San Francisco, and Puget

Sound, one station at each one, and then a balloon base line at each one of the same places, which is a lighter than air station.

Mr. SLEMP. Langley is completed now?

Gen. MENOHER. No, sir; it is not completed, but Langley does not enter in this in the way of additional construction. I was just enumerating the places.

Mr. SLEMP. Did you get appropriations for Langley Field from some other bill than this?

Gen. MENOHER. Yes; so that that is not connected up in any way with this.

Mr. SLEMP. Is Langley Field an aviation center or does it function with some other branch of war activities?

Gen. MENOHER. It will function particularly with the Coast Artillery. We are establishing a school there and will have a balloon school and a photographic school, and it will also be used as an operation station for duty with the Coast Artillery, and will be one of our primary stations, but, as I said, it is not connected up in any way with what we are asking for in this particular bill.

Mr. SLEMP. Are there any duplications of stations as between stations for Army purposes and stations for seacoast defense purposes?

Gen. MENOHER. I think not, sir.

LOCATION OF AIR STATIONS.

Mr. SLEMP. Where do you have aviation stations in the United States different from those that are under the jurisdiction of the Army, and where do you have them at points where there are stations under the jurisdiction of the Navy?

Gen. MENOHER. In addition to these along the coast, we have a station in Florida and we have one at Montgomery, Ala., and at Americus, Ga.

Mr. SLEMP. Do you have any along the coast other than Langley Field?

Gen. MENOHER. We have one at San Diego, and then we have a station here which is occupied temporarily, Bolling Field, and Mitchel Field, on Long Island.

Mr. SLEMP. You have none at Boston?

Gen. MENOHER. No, sir; none at Boston.

Mr. SLEMP. Has the Navy one there?

Gen. MENOHER. I can not tell you about the Navy, but I think not.

Col. FULLER. The Navy has not.

Mr. SLEMP. And at New York?

Gen. MENOHER. We have Mitchel Field, as I say, and that is an Army field.

Mr. SLEMP. Could not that field be used for your coastal defense purposes and thus permit of the elimination of some one of the stations in New York from your program?

Gen. MENOHER. I think not, sir.

Mr. SLEMP. Has that particular matter been submitted to the joint board?

Gen. MENOHER. Yes, sir; that has been considered.

Mr. SLEMP. Then why could not that be used as one of the stations along the coast?

Gen. MITCHELL. Staten Island is put in for an observation field; that is to say, for the aviation that is directly attached to the coast defense. They have to be near those coast defenses on account of liaison, on account of keeping communication with them, and Mitchel Field, on the other hand, is proposed to be used for offensive aviation, which consists of pursuit, attack, and bombardment aviation, which will be used directly against the air force that may be attacking.

Mr. SLEMP. Where is Mitchel Field?

Gen. MITCHELL. Thirty miles away from the coast defenses, at Mineola.

Mr. SLEMP. Thirty miles is not very far.

Gen. MITCHELL. It is very far to go with an automobile in case of an emergency when all the roads are choked up.

Mr. SLEMP. But it is not very far in flying.

Gen. MITCHELL. No; but the air observers must have direct, personal contact with the Coast Artillery themselves.

Mr. SLEMP. You are not going to use automobiles to supplement your flying machines?

Gen. MITCHELL. Automobiles are used on the ground to carry the personnel back and forth from the airdromes to the batteries to which they are assigned. You will remember that this is an accessory of the shore batteries. This is not offensive aviation in any way. These are used to observe the fire of guns along the coast and to reconnoiter for them, and as such the observers that are in those observation squadrons have to make personal liaison with the battery to which they are attached.

Mr. SLEMP. How would you go in an automobile from Long Island to Fort Michie?

Gen. MITCHELL. You would go from Stonington, Conn. Most of this work is done at night.

Col. FULLER. Fort Michie would be covered by the station at Stonington, Conn.

Gen. MENOHER. That is the eastern entrance to Long Island Sound project.

Mr. SLEMP. The only point I wished to bring out was the explanation of any possible duplication in the purchase of land, erection of buildings, etc.

Gen. MITCHELL. There is no duplication whatever in this case, Mr. Slemp. It has been very carefully thought out. Furthermore, there is a limit to the capacity of the airdromes, and these airdromes are only designed for the permanent occupancy of the outfits for the batteries now emplaced.

Mr. SLEMP. How many acres of land have we at Mitchel Field?

Col. FULLER. Six hundred and forty acres.

Mr. SLEMP. Is it all suitable for building purposes?

Gen. MENOHER. That is a flying field also, and it is all perfectly level land, subject not to overflow but in bad weather the drainage—

Mr. SLEMP. It has a water front?

Gen. MENOHER. No; it is way back from the water, but the drainage situation is not very good there.

Mr. SLEMP. Staten Island is the project you have for New York?

Gen. MENOHER. Yes, sir; we are building that at New Dorp, on Staten Island.

Col. FULLER. It is necessary to have these stations for the coast defenses on the water's edge, so they can use seaplanes in peace-time operations for over-the-water observation on account of the greater economy and safety for the personnel. Seaplanes could not be used at Mitchel Field, which is inland, but is the normal and proper place for offensive aviation, which in time of war would have to operate from this station.

Mr. SLEMP. Do all the stations to which you refer have seacoast frontage possibilities without exception?

Gen. MENOHER. Yes, sir.

Mr. SLEMP. How about Langley Field?

Gen. MENOHER. It has water front. You see an arm of Hampton Roads comes in there and it is half surrounded by water. To continue, the combined unobligated balance of the appropriation heretofore made for the continental United States is \$9,617,179.38. Plans are well under way for the expenditure of so much of this balance as has been appropriated to projects not requiring further enabling legislation by Congress prior to the commencement of the work thereon. These projects amount to \$2,906,770, leaving a net balance of \$6,710,409.38, which is allotted to projects which must be held in abeyance until further legislation is enacted for the purchase of land and the continuation of funds after June 30, 1920.

The prohibition against the purchase of real estate contained in the Army appropriation act for the fiscal year 1920 has prevented the carrying out of the intention of Congress with respect to providing adequate aerial defenses for the continental United States at the following places where land must be purchased.

Long Island Sound, Narragansett Bay, Boston, Portland, Me., and Puget Sound.

One paragraph of the enabling legislation would extend the effective period of continental United States aerial cost-defense appropriations until June 30, 1922, and would modify the prohibitory clause of the current Army appropriation bill to the extent of specifically authorizing the expenditure of not more than \$596,725 for the purchase or acquisition of the land necessary for aviation stations in connection with "aerial defense program."

Mr. SLEMP. Does that include the \$367,600 item for Narragansett Bay?

Gen. MENOHER. Not the \$367,600 item which is for construction at that place, but it does include \$69,000 for the purchase of the necessary land. The second paragraph of the proposed legislation we have would provide specific authority in the case of certain buildings. It would increase the price of certain buildings on which a limit is set by law. The cost of construction has been, of course, materially increased, and we find that we can not construct a certain set of quarters for the amount of money authorized.

Mr. SLEMP. As I understand it, there is no particular change in your project?

Gen. MENOHER. No, sir; there is no change.

Mr. SLEMP. There is no change in your project submitted this year, as compared with the one submitted last year and the year before, as to the number of stations of the equipment to be provided for the stations, nor in the amount submitted for the construction of buildings?

Gen. MENOHER. It is the same.

Mr. SLEMP. Your statement in regard to that would be the same as your statement last year before the committee in regard to the estimate?

Gen. MENOHER. Yes, sir.

Mr. SLEMP. And you have not been able to go on——

Gen. MENOHER (interposing). On account of the prohibition in regard to the purchase of land.

STATEN ISLAND PROJECT.

Mr. SLEMP. That statement does not apply to Staten Island, because that land was purchased before the prohibition went into effect.

Gen. MENOHER. That is true.

Mr. SLEMP. Has the work gone on there?

Gen. MENOHER. Yes, sir; the work has proceeded there.

Mr. SLEMP. How are you getting along with it?

Gen. MENOHER. We are getting along very well. I have not been there recently, and I can not, offhand, state the exact condition of the construction work there.

Col. FULLER. The technical building group is under way, and funds have been obligated for other portions of the construction.

Mr. SLEMP. Are those buildings to be built within the limit of cost as heretofore carried in the law?

Gen. MENOHER. They will have to be, unless it is increased.

Col. FULLER. We have just had a communication from the Construction Division stating that with the prices of labor and material certain of the quarters can not be constructed, notwithstanding the fact that the type proposed was a very much simpler type than ever heretofore constructed at an Army post. We cut them down to the simplest sort of light frame construction, but we still think that we must increase the limit a little.

Mr. SLEMP. In regard to those particular buildings at Staten Island, how much is that station going to cost when completed?

Col. FULLER. We have ascertained from the hearings what appears to be the desire of this committee—that is, that those stations must be constructed with the money provided, and for that reason we are cutting down on the plant and cutting everything down to the extent that it will be necessary to construct them within the limit of the total amount allotted for Staten Island.

Mr. SLEMP. What sum was given you last year?

Col. FULLER. \$1,200,000 for construction.

Mr. SLEMP. That will complete it?

Col. FULLER. Yes, sir.

Mr. BYRNS. That is exclusive of the cost of land?

Col. FULLER. Yes, sir.

Mr. SLEMP. The original estimate was not exclusive of the cost of the land?

Col. FULLER. I think you will find that the hearings show that very clearly.

Mr. SLEMP. Have you explained what you did with the rest of the money? You could not purchase land, but you have spent between two and three million dollars, and you have only partially completed

the work at Staten Island. What have you done with all that money?

Gen. MENOHER. I have a financial statement covering the expenditures under the various appropriations. Under the aviation seacoast defense act of 1917, \$114,750 is for the purchase of hydrogen cylinders; \$345,081.34 is for the purchase of hydrogen plants, Langley Field; \$185,000 is for two seaplane hangars, Langley Field, and \$249,947.80 represents miscellaneous items of which I have not the data here.

Col. FULLER. That covers the period from the date of the appropriation act to the present time.

AVIATION STATIONS, SEACOAST DEFENSES.

Gen. MENOHER. Then, we have the following items under the second appropriation for aviation stations, seacoast defense: Moving certain coast guard buildings at the Presidio, San Francisco, \$73,000.

Mr. SLEMP. You are using Government land there?

Gen. MENOHER. It is Government land, just inside of Fort Scott. The other items under that appropriation are increase of two seaplane hangars, Langley Field, \$45,000; purchase of land, New Dorp, Staten Island, \$420,041.48, and construction work at New Dorp, Staten Island, \$550,000, making a total of obligations under that of \$1,088,041.48. Then, there are certain reservations; that is, a small item of \$20 for rubber belts. Then under the appropriation for aviation stations, seacoast defense, the reservations are as follows: Increase construction, New Dorp, Staten Island, \$739,550; construction of 12 lighter-than-air stations on United States owned land, \$1,033,200; construction of heavier-than-air stations, San Francisco, \$1,134,000; there are eight of these.

Mr. SLEMP. Have you the locations of them?

Gen. MENOHER. This item involves six base lines, 1 balloon on each end of each base line, making 12. Then there are 2 others, 1 on land to be purchased at Narragansett Bay, and the other at Chesapeake Bay.

Mr. SLEMP. Will you put in the record a statement showing the location of them?

Gen. MENOHER. Yes, sir. I think it is already in the record. The sum total of the reservations and obligations amounts to \$4,889,590.62, leaving an available balance over and above obligations and expenditures of \$6,710,409.38.

Mr. SLEMP. A part of that money would be expended during the next fiscal year?

Gen. MENOHER. Yes, sir; up to June 30.

Mr. SLEMP. It can be obligated?

Gen. MENOHER. None of that is obligated. It will go back to the Treasury on June 30.

Continuing my statement, for the general information of the committee, it should be stated that the sites upon which these eight heavier-than-air stations and balloon base lines are to be situated have been arrived at after a very careful study of not only the existing, but also the future needs of the country. Boards of experienced officers were appointed by the Secretary of War on both the Pacific and the Atlantic coasts for the purpose of examining each

locality approved by the War Department as of sufficient importance tactically, commercially, and industrially to receive an allotment of one of the eight aerial coast-defense stations at present authorized. It should also be noted that each project was submitted to the aeronautical board (whose membership is drawn from the Army and Navy and which was constituted for the purpose of aiding the cooperation and preventing the duplication between these departments in connection with their major projects) and approved by them before the final approval by the Secretary of War.

ACQUISITION OF LAND.

Mr. SLEMP. Can you give us a statement of the proposed cost of the land in all of those stations, showing the number of acres that you get, and the locations?

Gen. MENOHER. Yes, sir. For the station at Portland, Me., 130 acres at Falmouth, \$88,750; for the Boston station, 65 acres at Weymouth, \$351,475. That is enormous, but the country has been combed over and it is the only place that could be found, according to the reports, that is suitable for the purpose anywhere in that vicinity. We know that that is very high. The next one is Narragansett Bay, 130 acres at North Kingston, R. I., for heavier-than-air station, \$50,000; 10 acres at Sachuest Neck, R. I., for lighter-than-air station, \$16,000; and 3 acres adjoining Fort Kearney, R. I., for lighter-than-air station, \$3,000. The remaining one is at Puget Sound, covering 200 acres on Whidbey's Island, for heavier-than-air station, \$60,000, the total amount being \$596,725.

Mr. BYRNS. The other stations will be erected on Government land?

Gen. MENOHER. All on Government land. There is only one place where we are purchasing land at this time for a balloon base line and that is at the entrance to Narragansett Bay. There is one item I omitted: Eastern entrance to Long Island Sound requires a station, and we propose to buy 100 acres at Stonington, Conn., at a cost of \$27,500.

Mr. SLEMP. You have no stations from Cape Henry to San Francisco; why was that large part of the coast eliminated?

Gen. MENOHER. It was not eliminated from the complete project, which I could give you; but it is my understanding that it was the intention of Congress that these eight stations should be established in connection with the coast defenses, and that they should be established at the places that I have named, and those are the ones the construction of which we are urging at this time.

Mr. SLEMP. Have you made contracts for the purchase of this property so that you know the price, or is this an estimate?

Gen. MENOHER. This is an estimate. The real estate section is handling the matter of the purchases, and they are here and can give further information in regard to that. The complete project called for stations at the following places: Portland, Me.; Boston; Narragansett Bay; eastern entrance to Long Island Sound; southern New York, or Staten Island; the defenses of the Delaware, the defenses of Chesapeake Bay; Charleston; Key West; Pensacola; Galveston; San

Diego; Los Angeles; San Francisco; Columbia River; and defenses of Puget Sound.

Mr. SLEMP. And you are proposing to construct eight?

Gen. MENOHER. We are proposing to construct the eight more important ones, and if you will follow them you will see that they are the most important ones. Portland, Me., is the closest point to Europe; Boston and Narragansett Bay are very important bases; the eastern entrance to Long Island Sound is important; and, of course, southern New York is. We have Langley Field for Chesapeake Bay, and then there are no particularly important places between there and San Francisco.

Mr. SLEMP. Are there any naval aviation stations along there?

Gen. MENOHER. There is a naval station at Pensacola.

Mr. BYRNS. You have a station at San Diego?

Gen. MENOHER. Yes, sir; there is a combined station there at San Diego.

Mr. SLEMP. Have you a station in combination with the Navy at any other point?

Gen. MENOHER. Yes, sir; one at Ford Island, Hawaii, and one at Coco Solo Point, Panama.

COORDINATION OF AVIATION ACTIVITIES.

Mr. SLEMP. In the event of the enactment of the provision in the Army bill in regard to the formation of an air service, would all of the activities relating to the air service now under the Navy, Army, and Coast Defense be taken over by one department?

Gen. MENOHER. Yes, sir. There would be, as I understand it, under the terms of the proposed legislation for a separate Air Service, a certain proportion or a certain amount of the personnel, facilities, etc., turned over to the Army and the Navy to operate.

Mr. SLEMP. Would it not be well to postpone the consideration of this entire project until, say, another year in order to let the proposed new department function on what the need should be?

Gen. MENOHER. I think not.

Mr. SLEMP. And to coordinate all of the aviation activities?

Gen. MENOHER. I think that so far as this goes it would make no difference. This will have to go on, whether we have a separate Air Service or have the service to remain as it is at present, with a part under the Army and a part under the Navy.

Mr. SLEMP. Are you not forestalling in your mind what the judgment of the new chief of the service might be?

Gen. MENOHER. No, sir; I think not. Of course, in a measure it would be; but I think that no matter how the service is organized these projects will go on.

Mr. SLEMP. We could not lose anything by it, because you have not bought the land or expended the money.

Gen. MENOHER. I think that no matter what the future of the Air Service may be, whether it is separate from the Army and Navy or left as it is, all of this will be required.

Mr. SLEMP. Considering the effect that delay might have on the expense, do you not look for a deflation of costs pretty soon, and do you not think that land values, which have been considerably inflated,

will be deflated? I am sure that is the economic theory now accepted in this country.

Gen. MENOHER. I am afraid that we would have to wait a long time before we would have any material reduction there.

Mr. OGDEN. What was the estimated cost of constructing the 16 stations?

Gen. MENOHER. About \$16,000,000. The figures were about \$1,000,000 in each particular case. That estimate was made several years ago.

Mr. OGDEN. How much will the eight stations cost?

Gen. MENOHER. That was the original estimate; but, of course, construction costs have increased. Those eight stations, according to that estimate, would cost \$8,000,000, and \$9,000,000 was appropriated in 1912 for aviation stations for the coast defense. The idea was to secure the construction of those eight stations with that amount of money plus the available balance from the former appropriation.

Mr. OGDEN. In addition to the \$8,000,000, you would expend a certain amount of money for the purchase of land?

Gen. MENOHER. Yes, sir.

Mr. OGDEN. How much will that be?

Gen. MENOHER. \$596,725.

Mr. OGDEN. How many of the eight stations will be located on the Atlantic coast and how many on the Pacific coast?

Gen. MENOHER. Six of them are to be on the Atlantic and two on the Pacific.

Mr. OGDEN. How many balloon stations will you provide?

Gen. MENOHER. There will be one in each one of these eight projects. There will be two balloon stations at each, forming a balloon base line, so to speak. There will be one at Boston, one at Portland, one at Narragansett Bay, one at the eastern entrance to Long Island Sound, one in New York Harbor, one in Chesapeake Bay, one in San Francisco Bay, and one in Puget Sound.

Mr. SLEMP. If this work were continued, would you be able to complete the eight heavier-than-air stations and also the balloon station that you have mentioned and buy the land all during the next fiscal year?

Gen. MENOHER. No, sir; we would like to have that extended for another fiscal year.

Mr. SLEMP. For two years?

Gen. MENOHER. Yes, sir; we would like to have an extension of one year. We would like to have that appropriation available until June 30, 1922.

Mr. SLEMP. A reappropriation, then, would complete the installation of those stations that have been mentioned heretofore, so far as you know, under the present cost of material and labor?

Gen. MENOHER. Yes, sir; except that we have an item of increase in the cost of certain buildings—that is, in officers' quarters—the limit on which is \$12,000 for one and \$15,000 for another; but it is all within the appropriation.

Mr. SLEMP. This appropriation does not provide airships, does it, or does it equip each station with a certain number of planes or balloons?

Gen. MENOHER. No, sir; that comes from another appropriation and from material on hand. We have a great mass of material on hand.

Mr. SLEMP. You might find yourself with stations but without any airships.

Gen. MENOHER. We have sufficient airships to carry on a pretty considerable protection along the coast.

Mr. BYRNS. Does your service purchase land, or is that done by another organization?

Gen. MENOHER. That is done by the real estate department or section.

Mr. BYRNS. I was wondering what they did when they were confronted with a proposition like that you referred to of having a demand made for more than \$5,000 per acre for land.

Gen. MENOHER. They would resort to condemnation proceedings. That is the rule that they follow.

Mr. BYRNS. They go into court?

Gen. MENOHER. Yes, sir.

Mr. BYRNS. And have the court fix the price?

Gen. MENOHER. Yes, sir.

Mr. SLEMP. Does that complete your general statement?

Gen. MENOHER. Yes, sir; with regard to the United States, but I have not taken up Panama, Hawaii, and the Philippines.

Mr. SLEMP. Can you make a statement in regard to the usefulness of these stations for actual coast-defense operations, and also covering what experience you have had that would justify your conclusions in regard to them? Perhaps later on you would wish to abandon these stations and try something else.

Gen. MENOHER. I think not. I think that matter has been gone into very carefully not only at the time they were originally proposed, but since then, and I do not think there is any division of opinion as to the necessity for air defense at those various points. Later on, it will probably be desirable to extend this service to some other stations along the coast.

Mr. SLEMP. How many airships would you have at each station if it were equipped as you would like to have it?

Gen. MENOHER. I can not give you that offhand.

Mr. SLEMP. What additional cost would there be altogether in completing the stations after you have the buildings constructed under this appropriation? What additional amount would you have to spend?

Gen. MENOHER. Practically nothing, except to put in the airships.

Mr. SLEMP. How many men do you have to have at each station?

Col. FULLER. One observation squadron of 132 men.

Mr. SLEMP. What would be the cost of the maintenance of an air station as compared with Coast Artillery?

Col. FULLER. I have not any figures on that.

Mr. SLEMP. These stations are to be operated along with the Coast Artillery; or they work together?

Col. FULLER. Yes, sir.

Mr. SLEMP. They are supplemental?

Col. FULLER. Yes, sir.

Mr. SLEMP. Do you regard them as more important than that?

Col. FULLER. It is supplemental only.

Mr. SLEMP. I would like to get into the record in some way an authoritative statement as to the conclusions drawn with regard to the air work from the experience of the war. We have had that information put in the record with regard to the various types of artillery and ammunition, but we have not had any authoritative statement of that sort with reference to the air service.

Gen. MENOHER. I would like to say that what is proposed here has to do with the coast defense, or the defense of the coast in connection with the Coast Artillery defenses that are already established. It does not touch upon the broad subject of defense from the air alone, or operations in conjunction with our mobile Army.

Mr. SLEMP. I suppose these stations would be used in observation work and, so far as protection planes are concerned, for the protection of industrial plants and cities.

Gen. MENOHER. They would be used for observation work and for fire control of coast artillery, and in all of those matters connected with the coast defense.

Mr. SLEMP. These particular stations are subordinate to the coast defenses proper, and are not looked upon as major projects?

Gen. MENOHER. No, sir.

Mr. SLEMP. It does not involve powerful battle planes, or the equipment of this service with such airplanes as you would have in the Navy?

Gen. MENOHER. No, sir; not at all.

Mr. SLEMP. It would include the offensive power——

Gen. MENOHER (interposing). Equipping the Nation with the air weapons like you would have the Navy, for instance.

Mr. SLEMP. Equipping with air weapons like the naval vessels are equipped?

Gen. MENOHER. Yes, sir.

Gen. MITCHELL. That is really a part of the Coast Artillery; the Coast Artillery could not function without this air service.

Mr. BYRNS. It is the eyes to them?

Gen. MITCHELL. Yes; this has nothing to do with the other air defenses of the country.

Gen. MENOHER. Now, it is a well-known fact, well known to every artilleryman, that there is no use shooting your guns unless you can see where the shells are falling, unless you are firing from a big vessel lying 30 or 40 miles out of New York and having them hit Manhattan Island, say. So it is necessary, in order that the coast defenses may function efficiently, to have eyes, as Mr. Byrns suggested.

Mr. SLEMP. Who works out the question of fire control from the airplanes?

Gen. MENOHER. It is done by the Coast Artillery Corps. Now, to continue what I have to say: I brought Gen. Mitchell with me to answer just such questions as you have in mind.

Mr. SLEMP. We want to get a statement from Gen. Mitchell later.

Gen. MENOHER. I want to state that, as a general proposition, as to the necessity for the air defenses under modern conditions, there is no difference between myself and Gen. Mitchell on that; absolutely none, although we do differ on the question of a separate air service as such, as set forth in a couple of bills that have been introduced. But as to the function of the Air Service, the peculiar use

of the aviation, there is no difference between Gen. Mitchell and myself at all.

Mr. SLEMP. When you are speaking about these airplanes being used for defense outside of reconnoitering, etc., you haven't worked out your system of fire control by which you can notify the batteries, have you?

Gen. MENOHER. That is being done.

Mr. SLEMP. You can say, it went over so many yards, or fell short so many yards?

Gen. MENOHER. That is worked out. I would like to have Gen. Mitchell answer that, as I brought him along for that purpose.

Mr. SLEMP. Just give a brief statement of how that is determined.

FIRE CONTROL FROM AIRPLANES.

Gen. MITCHELL. Roughly, it is this: From the reconnoissance airplane over the water you find out what you are going to shoot at—what the target is; next, what kind of fire is necessary from the shore guns against that target, whether it is an armored ship or an unarmored ship; this is given the Air Service by the Coast Artillery commander. Now, as to the actual fire on that object, the method of observation depends on the range at which the fire is conducted. If it is 15,000 yards and it is a comparatively clear day, the fire is conducted from a base line, observation balloons are used to give a higher platform from which to observe, but the method is similar to the old system. If the range is 30,000 or 40,000 yards, or, as it is intended, 60,000 with the 16-inch guns, you have to locate your first shots by directional wireless telegraphy because the target is well out of sight of land. The fire is then continued according to the information sent back from the airplane by radio. That, roughly, is the method. The system is about the same as it is on land. The difficulty is that when firing over the water there are no fixed objects to which you can refer; the water is all the same. The ship is moving, so that it is a more difficult problem to locate your target on water than it is to locate a target on land at the long range.

Mr. SLEMP. Now, this particular bill only has application to these eight stations, air stations?

Gen. MENOHER. Yes, sir.

Mr. SLEMP. And do you consider that a good start in aviation defenses?

Gen. MITCHELL. Mr. Slemp, the efficiency of these air stations for work with the Coast Artillery depends on the work done from the ground between the personnel of both services. You have several different elements that you have to bring into coordination, and it requires a great amount of work to keep them functioning properly. The Coast Artillery on the ground and the airmen in the air have to work together perfectly to keep the system functioning, or the whole thing falls down. This kind of Air Service for observation purposes is, in fact, an auxiliary of the Coast Artillery. In the presence of an enemy, any work done in the air has to be fought for; you can not just fly around unimpeded; you have to fight for what you get. It, therefore, requires a tremendous amount of training for that work, because so many different elements are involved. As I mentioned a while ago, the Air Service has to keep in intimate

touch with the batteries, and this liaison ordinarily is kept up from the airdrome to the batteries by automobile along the roads at night so as to be ready for the next day. All this observation aviation has to be protected by pursuit aviation. Our pursuit aviation must fight and destroy the enemy pursuit aviation to enable the observation aviation to work.

Mr. SLEMP. That will bring up the whole problem of aviation?

Gen. MITCHELL. The whole problem of coast defense of the country. We believe to-day that the second line of defense is the aviation; the first, at present, is the Navy. We believe, eventually, that aviation will be the first line of defense.

Mr. SLEMP. I would like to hear you a moment on that question; there was no vessel destroyed by aviation in the late war?

DESTRUCTION OF VESSELS BY AIRCRAFT.

Gen. MITCHELL. Yes, sir; there were. There was no aviation, strictly speaking, developed for offensive purposes on the water. What was used over the water was mainly for observation purposes, with a little haphazard adaptation to fighting purposes. In spite of this, the following vessels were lost or destroyed by German aircraft:

Date.	Num-ber.	Gross tonnage.	Date.	Num-ber.	Gross tonnage.
BRITISH.			BRITISH—continued.		
1915—March.....	8	10,915	1917—June.....	1	1,213
April.....	2	3,542	July.....	6	8,337
July.....	1	988	September.....	2	9,966
September.....	1	1,270	December.....	1	353
October.....	1	1,408	1918—February.....	1	2,686
November.....	2	2,657	March.....	1	1,855
December.....	1	2,414	1916—February.....	1	970
1916—January.....	2	3,372	1917—May.....	1	2,784
February.....	1	1,680	June.....	1	3,718
May.....	5	17,016	September.....	1	440
July.....	1	1,081	Total.....	48	97,139
August.....	1	7,988	OTHER THAN BRITISH.		
1917—February.....	1	3,563	1918—April.....	1	127
March.....	2	2,292			
April.....	1	1,780			
May.....	1	2,821			

The United States aircraft attacked and possibly sunk 15 submarines during the period of the war.

Mr. SLEMP. All right; you say it was the second line of defense; why didn't the German aviation go out and destroy the British fleet, or vice versa?

Gen. MITCHELL. Because aviation was not started until this war, and the airplanes were not sufficiently developed; they were throwing down some projectiles of small size on the water, but the aviation had to concentrate on the western front where this war was fought—not on the water.

Mr. SLEMP. What I am trying to get from you is what actual proof have you, so far as this war is concerned, that aviation is the second line of defense?

Gen. MITCHELL. We have the proof given above, the experience we obtained from the war on land, and experiments that have been made

against ships, and the means which we are now perfecting for use against ships. We also know, to some extent, the preparations the various nations are making with that end in view.

We have made experiments with certain projectiles to be used on the water from the air. The effect of those projectiles and the damages that they are able to cause, we believe can not be resisted by warships operating on the surface of the water.

Mr. SLEMP. Was that development quite remarkable during the war?

Gen. MITCHELL. Aviation was the greatest development that has ever been known in any military line. In fact, there never has been so rapid a development of an offensive military arm since the world began.

Mr. SLEMP. Does that apply both to speed and the amount of tonnage they can carry?

Gen. MITCHELL. Yes, sir; to the construction of the aircraft themselves, to the development of air armament, the development of communication in the air itself, and the application of the Air Service to a concentration of air forces at a specific point with a rapidity never thought of before. Military decision always rests, and has rested since time began, in developing a greater punch than the other man has at the vital point. You can find out where your forces are needed in the air, and then get there through the air and deliver the punch. That means assembling more rapidly at that place than the enemy can. You can concentrate four or five times more rapidly in the air than on water or on land. You can go 150 miles an hour in the air, while you can go only about 30 on land.

Mr. SLEMP. While the offensive power of planes was largely increased, the defensive armament and protection against offensive machines was not so greatly increased?

Gen. MITCHELL. The only defense against air forces are other air forces. Antiaircraft artillery, etc., is an auxiliary of air forces; its efficiency has been increased to some extent. But the great advances were made in the air itself. The principle is now recognized everywhere in the world, that, in order to predominate on the water or on the land, you must get predominance in the air itself first. Unless that is obtained, you can not bring a force to bear on land or on water with effect.

Mr. SLEMP. General, the logic of this situation would bring it down to the gradual elimination of our Coast Artillery posts?

Gen. MITCHELL. Probably so in the future, but not for a long time.

Mr. SLEMP. There is a little margin of chance there that you would not do away with?

Gen. MITCHELL. No, sir; because, as long as you have a Navy and the possibility that you might be dominated in the air or on the water, you must keep a certain amount of armament where it could be used as a basis of protection.

Mr. SLEMP. The point I had in mind was this: You could not imagine an army being landed on our coast with the control of the air on our side?

Gen. MITCHELL. No, sir; it could not be done.

Mr. SLEMP. You do not think that could be done; you could not imagine that being done?

Gen. MITCHELL. No, sir; it could not be done.

Mr. SLEMP. If that could not be done, the need of railway artillery and——

Gen. MITCHELL (interposing). That is very important, railway artillery. Here is the proposition as to coast defense: You determine where the enemy is coming from by aircraft; that is the only way you can determine quickly. In other words, you carry on the reconnaissance through the air and get information, and that information is gotten back by your aircraft as to the location of enemy aircraft or enemy vessels, and that information can be used by the Army or the railway artillery.

Mr. SLEMP. Do they have freight airplanes, so to speak, that would accompany the combat planes?

Gen. MITCHELL. We send out the fastest airplanes we have at the highest altitudes to get the first information and bring it back. In other words, it is like the old patrols of the cavalry that were sent out to get the information. They go as rapidly as possible and at the highest altitude possible so as to escape hostile pursuit and get back at the greatest speed. Having determined where and when your greatest attack by the enemy is coming from, you concentrate your forces there with the greatest rapidity possible. And in that concentration, if the coast is threatened, should go to the railway artillery. In other words, your coast should be organized with a certain amount of fixed defenses at important places; just as little as you can get along with and carry out your purposes, and then put the rest of your gun defense at a point where you can concentrate it in the shortest time.

Mr. SLEMP. I have heard it stated by the military authorities that you had to fly so high that you could not drop your bomb with accuracy at a moving target.

Gen. MITCHELL. I would like to take you and show you how that is done some day.

Mr. SLEMP. They stated that here yesterday, and cited the case of the *Goeben* which was attacked, and that the ship was not put out of business.

Gen. MITCHELL. Neither did heavy artillery, torpedoes, or anything else that was used have any more effect than aircraft against the *Goeben*. The case of the *Goeben* is no criterion, and it apparently is picked up as a last straw in the attempt to strengthen an argument that aircraft are no good for offensive purposes. I desire, therefore, to put in the record just what happened to the *Goeben*.

Mr. SLEMP. Very well.

Gen. MITCHELL. The *Goeben* at the time in question was aground against the shore about half way through the Strait of the Dardanelles, and partook of the nature of a coast fortification and not a ship. She was surrounded on the shore by antiaircraft cannon. The *Goeben* was bombed for several hours with monitor 9.2 guns—the effect is not known. The vessel was fired at across the Dardanelles from shore batteries without effect. The monitor *Raglar*s and the *M-28* were in action 9 minutes against the *Goeben* and were sunk by her. The *Goeben* was attacked with all sorts of watercraft and not hurt by them apparently. What little bombing was done appears to have been in the daytime, with a 120-pound bomb. This bomb carried 60 pounds of explosive.

These are just about as effective against an armored ship as throwing an egg at a tank. It is utterly foolish to suppose that any such bomb would have any effect against an armored ship such as the *Goeben*. I wish here to call particular attention to evidence that is given purporting to show a certain thing without the exact conditions being made known to the committee. Five hundred or one thousand pound bombs at least are necessary to be used against a ship of this type. There was no airplane equipment and no bomb equipment in any way adequate to attack the *Goeben*. What the *Goeben* did prove was that cannon, both coast artillery and on ships (which had been developed for hundreds of years), failed to sink her, and not that airplanes could not sink her. All the airplanes that attacked her had to stay up about 10,000 feet; it was nothing but a desultory attack from the air. An attack made from the air has to be made in mass. In other words, you can not destroy an object merely by sending one airplane or two airplanes or three airplanes against it. If you desire to destroy any object with bombs from the air, you have to calculate how many projectiles and what size it will take, and at what altitude you have to attack. If on account of antiaircraft defenses the airplanes have to fly at 10,000 feet, you have to calculate your per cent of hits, and all your calculations have to be carefully made. You must attack en masse. We have had as high as 300 airplanes up at one time on such a mission. At the high altitudes the percent of hits is not so great. If, on the other hand, you can reduce the altitude and come down within 3,000 feet, you can hit every time. What the attack on the *Goeben* really proves is that cannon fire, both from coast artillery and ships, did her little harm. She got off the ground later and went to Constantinople.

Mr. SLEMP. Every time?

Gen. MITCHELL. Yes; we can hit this building, for instance, every time.

Mr. SLEMP. Is that what you mean by launching a torpedo?

Gen. MITCHELL. No, sir; we do not believe so much in torpedoes. They are interesting, but we question whether they will be as effective as bombs. However, that remains to be found.

Mr. SLEMP. Have you seen any cases in this war where a battleship was successfully attacked by the airplane service?

Gen. MITCHELL. No battleship was ever attacked by an air force to a finish.

Mr. SLEMP. Why didn't they do it?

Gen. MITCHELL. They hadn't developed it. They were too busy on land, and no air equipment specially for attacking a navy was developed.

Mr. SLEMP. You mean they were so busy on the land they did not have time to develop their use on the water?

Gen. MITCHELL. Yes; and they had so few at sea, also. The aircraft on the sea were directed against submarines, almost entirely.

Mr. SLEMP. The Germans could have used their airplanes against the British and broken up their fleet?

Gen. MITCHELL. Their air service at Jutland practically saved their fleet. They had a line of Zeppelins there; 12 Zeppelins that kept surveillance on the British fleet all the time. The Germans proposed, in case the British fleet came out, to attack it from the north with their fleet. When the British main fleet came out from the

north there was a part of the British fleet also on the south so as to catch the Germans in between. When that fleet came out the German airships kept watch over the British fleet from the south, and, before that fleet from the south could come up to them the German fleet had extricated itself and gotten out, due entirely to the Zeppelins.

Mr. SLEMP. That was not offensive?

Gen. MITCHELL. No, sir; there was no offensive action taken during this war in any serious way, that we know of. It was not organized for that purpose. Had the Germans obtained a decision on land, they had plans for attacking the British fleet with aircraft—all of which was kept very quiet by them.

Now, we can point out some interesting things. Not that we wish to draw in other services or compare the Army with the Navy, but, for instance, we will say that a navy has obtained a decision over our Navy and is free to go where it wishes, and under those conditions it approaches our coast. We will suppose that the direction of that advance has been determined by aircraft. Now, they will not expose themselves to the range of our land guns—that is, any equipment we have to-day. But if they wish to destroy a city, like New York, they will do it from the air. They will carry airplanes along to do that, and in furtherance of that object they will attempt to get control of the air with pursuit aviation. No guns can hurt a city in comparison to the air projectiles. For instance, you take one of the 16-inch projectiles that weighs a ton—it has only about 50 pounds of explosive. A projectile fired against a ship designed to pierce armor has to have mass and velocity. The damage is done inside of the ship by fragments actually piercing it, not by explosive effect. Our air projectiles have one-half their weight in explosive. Take a 1-ton bomb, with a half ton of explosive, and that will wreck this whole place, whereas a ton cannon projectile, with only 60 pounds of explosive, will only make a hole.

Mr. SLEMP. That is a half ton as compared with the 50 pounds of explosive?

Gen. MITCHELL. Yes, sir; our bombs have about half of their total weight in explosives. Therefore, wherever an explosive bomb is used from the air about half of it is active.

Mr. SLEMP. What is the heaviest projectile that you carry?

Gen. MITCHELL. The heaviest now is 1,000 pounds.

Mr. SLEMP. Have you got projectiles weighing that?

Gen. MITCHELL. Yes, sir; here is a picture of them [indicating]. We are designing now a 3,000-pound bomb, and we have an airplane now that has been built and has not yet been tested which will carry two of those. They will contain a very high percentage of explosive.

Mr. SLEMP. And 500 pounds of that 1,000 pounds would be of the very highest form of explosive?

Gen. MITCHELL. Yes, sir.

Mr. SLEMP. As compared with 50 pounds in the 16-inch shell?

Gen. MITCHELL. Yes, sir. Now, to go back, we must predominate in the air to do anything. I mean, no matter whether we attack offensively or whether we act defensively in connection with the Coast Artillery, we must get control of the air through pursuit aviation. Therefore, you must have pursuit planes, no matter what happens. Your first line must be pursuit which can catch up to the

enemy and bring on the fight. If you wish to attack a fleet directly—I have a small diagram here which shows a fleet out here [indicating]—you have to have your pursuit aviation to obtain your decision. I show them in three tiers, because as our ability to get altitude went up and we got into the upper air we were flying at about 18,000 feet. I put this here to show that situation. Now, supposing that the contest between the opposing pursuit aviation has been in our favor and we decide to attack the armored ships—there is no argument by anybody about the unarmored ships; they can be sunk easily by aircraft.

Before showing this diagram, I would like to tell you a few things about defenses against aircraft. The main defense against hostile aircraft is pursuit aviation; attacking them in the air, that is supplemented by antiaircraft artillery, machine guns, etc. Good anti-aircraft guns can reach up 35,000 feet. These must be combined with searchlights and curtains of wire raised around cities by balloons, into which hostile airplanes may run. On the land, these defenses against aircraft can be concealed very easily; under trees, or holes in the ground, so that they are difficult to find. On the water, they must be confined to the decks of the ships; a ship can not hide itself, except by getting under the water, and then it is not a ship, but becomes a submarine. All vessels can be seen very easily unless they are in a fog, or a heavy rain or snow, and then they can not see themselves. Now, if we know where the antiaircraft defenses are, we can attack them in such a way as to occupy their whole attention, or render them impotent. We had a lot of experience with this in Europe. Searchlights, we can put out by bombs, or we can use parachute flares at night which blind a person when looking up. Suppose, then, that we have obtained a decision in the air, and we wish to attack a fleet, and have aviation organized so that it can concentrate at these stations, as Gen. Menoher has pointed out, which are the outposts of aviation. Suppose we concentrate, and our fighting unit is 100 airplanes, which we call a group (it is analogous to the Infantry battalion). Three groups or a wing correspond to an Infantry regiment. Suppose we move in with that attack aviation at low altitude to occupy the antiaircraft on the ships, because this is their sole means of defense if their aircraft are gone. Suppose we have 100 airplanes, each one of which is capable of carrying six 1,000-pound bombs, and can operate out 200 miles at sea and get back safely. Suppose, of those 100 airplanes, we have 60 per cent ready for duty, which is the ordinary minimum amount we have for duty in our groups. Suppose each one is carrying six 1,000-pound bombs. The biggest mines that the Army uses weigh about 1,700 pounds, and they have 200 pounds of explosive. The biggest depth bombs the Navy used had 600 pounds of explosive. Those are the very largest kind they use, and those projected for use from aircraft have 500 pounds of explosive for the 1,000-pound bombs and 900 for the 1,800-pound bombs.

Now, with this 1,000-pound bomb we have a little over 500 pounds of explosive in it. To be effective a mine or bomb has to explode in the water within 30 or 40 feet of the object—that is, anywhere from 30 to 40 feet away from it. Supposing now that the length of the ship is 800 feet, and we have a space on each side available of 30 feet into which the bomb can fall and it will affect the ship sufficiently

that it will make it fall out of its formation, and therefore put it out of action at least. Therefore, cutting out any effect that we could have on the deck of a ship itself, if we can hit a space 800 feet long and 60 feet wide in which to drop the bomb, the chances are that we will cripple that ship. Let us go back to this bombardment group. We have a group that is assigned to attack four battleships. Suppose we detail one squadron out of the group to attack each battleship, and, as I said before, we have 60 airplanes out of 100 in the entire group, which will give you 60 airplanes with which to attack the battleships. Each squadron will have 90 bombs, or 6 for each airplane. If each squadron drops in formation, 15 bombs may be thrown at one time and six separate attacks made. Any single hit, as described above, will make that ship fall out or sink.

Now, the naval officers, whom I have discussed this thing with quite carefully, believe that the effect of that great amount of explosive dropped on a ship and exploded on the deck of the ship will have a great effect on the ship itself, particularly if it strikes near the funnels or the turrets, bridge tops, ventilators, etc., but we make no claim for that until we have actually proved it. In addition to explosive bombs the Chemical Warfare Service is perfecting an incendiary bomb containing thermite, which produces 4,000 degrees of heat. We had incendiary bombs, and if we put a little drop of that thermite on a stove lid it burns right through it, and it has that same effect on steel. We believe with proper ignition of heavy projectiles of thermite and the ability to hold that together in a concentrated mass that we can burn through any protective deck of battleships.

Mr. SLEMP. It has to go to the bottom to be destructive.

Gen. MITCHELL. We believe we can make it so hot that it will be a difficult proposition to save the ship, from the heat alone. Remember, there are 1,000 pounds of that stuff, and it is a big proposition.

We will have heavy gases which will get into the ventilators of the ships. And also smoke-producing compounds to cover them with smoke screens. They are making them now in small bombs for us to try. A combined attack with those various kinds of bombs, we believe, in a comparatively short time will be brought to such a state of perfection that it will be hard for battleships to escape.

Now, as to the armor-piercing part of the thing, we have an armor-piercing shell which we are about ready to try now, but we do not believe in it much.

Mr. SLEMP. You have to have too much velocity?

Gen. MITCHELL. We have to go up about 16,000 feet to get the velocity, and at present it is hard to hit from that altitude. All those things are developing, however.

Now, as to light-caliber guns, the 37-millimeter cannon is very fine; it shoots at the rate of 100 per minute, and we are mounting now a 3-inch cannon on an airplane.

Now, we can take these same airplanes and put torpedoes on them. The torpedo has only been developed for water ships. These ships go about 16 yards a second. Our airships will move about 90 yards a second. The same airplanes that we use for operations on the land will be used in this operation against fleets. We will have to change the character of the projectile to some extent.

Mr. SLEMP. Gen. Mitchell, was there any further statements you desired to make in regard to the cost of affording the kind of protection that you have in mind? I understand that you have some figures that you would like to submit.

Gen. MITCHELL. I would say, Mr. Chairman, that a 16-inch gun, with its mount, costs \$500,000, and each shell fired out of it costs about \$2,000, and the maximum range provided for such a weapon is 60,000 yards. Our heavy bombardment planes do not cost over \$100,000 each, and the projectiles cost very much less than the armor-piercing projectiles required for artillery rifles. A battleship to-day costs over \$30,000,000, and we could build and maintain at least 500 bombardment airplanes for the cost of 1 battleship and we could maintain 1,000 pursuit planes for the cost of 1 battleship. There is nothing that will bring for the amount invested greater results in the way of promoting the national defense than the air service.

I want to say further that we should contemplate the coast defense under one specific system of defense. In other words, if you persist in the mistake of not forming a united Air Service, then you should concentrate the defense from land in the Army. You should make the Navy develop its aviation service for duty on the sea, with the fleet, instead of having it hanging around the coast in places where, in my opinion, they should not be. The function of observation on the coast and all along the coast is the proper function of the Coast Artillery.

Mr. SLEMP. You would not abolish the naval aviation stations, would you?

Gen. MITCHELL. Yes, sir; I would.

Mr. SLEMP. Then you would have only such airships under the Navy as would be engaged with the fleet?

Gen. MITCHELL. Most decidedly, with the fleet. I would allow the Navy to have a fleet airplane base on the east coast and one on the west coast, but they would have to concentrate their work with the fleet and not spread over the land, with an expensive duplicate system that detracts directly from the efficiency of their fleet.

Mr. SLEMP. I wish that we were in a position to give it something more than intellectual consideration.

Gen. MITCHELL. If you want success in anything of this kind, you must concentrate all of your power where it is needed and not have it scattered. In your coast defenses where they are using artillery you must have observation aviation as a part of the coast defense itself. That is necessary in carrying out the functions of the coast defense, in determining where the enemy is located, and in maintaining a general surveillance and observation along the coast. Where you have another department doing that you not only duplicate the service but you complicate it.

Mr. SLEMP. You would put the naval aviation with the Navy itself or with the fleet?

Gen. MITCHELL. Yes, sir.

Mr. OGDEN. According to your idea it is advisable to go a little slow with the establishment of these stations, is it not?

Gen. MITCHELL. No, sir; this is a very conservative estimate. I believe that, as a general proposition, we should put money in air-

craft instead of in buildings and ground, but I do believe that in time of peace, where we have a permanent personnel that makes the Air Service its business, and where you must work out a certain coordination between the Coast Artillery and the Air Service, air stations should be provided. In that case you should provide permanent stations. When there is expansion for war, there is no service that can establish stations as quickly as we can. In other words, they can cover the coast all the way down from positions which have been inspected and selected ahead of time; but in time of peace we want to get these stations that Gen. Menoher has referred to established and in working condition.

Mr. SLEMP. You are now arranging for the airplanes and balloons to go along coincidentally with the building of these stations?

Gen. MENOHER. Yes, sir.

Gen. MITCHELL. I would like to mention in this connection the fact that our most vital stretch of eastern coast is from Boston Bay, inclusive, to Chesapeake Bay, inclusive. A central point on that stretch of coast for our attack, pursuit, and bombardment groups, would be somewhere in the northern part of Pennsylvania or in New Jersey, and from such a central point, we could get to any point along that stretch of coast in three hours. We can lay out in advance where all those things are to go. In other words, we can have the entire scheme laid out, with stores of equipment and material so that it can be quickly installed in case of war. Now, in the defense of the coast, in my opinion, you must take into consideration the question of defense against hostile aircraft, and that involves apparatus for listening for hostile aircraft, and other antiaircraft matériel, such as searchlights, balloon barrages, etc. For instance, in the defense of London, nets were lifted by lighter-than-air craft, and until that system of defense was adopted around London, the Germans flew right over the city in broad daylight.

Mr. SLEMP. Was that method effective?

Gen. MITCHELL. It was one of the important elements of defense. All of those things must be taken together.

Mr. SLEMP. Have we any facilities or equipment of that character in our possession?

Gen. MITCHELL. None whatever.

Mr. SLEMP. We have the protection of 3,000 miles of water.

Gen. MENOHER. That is a highway instead of an obstacle now.

Gen. MITCHELL. The air goes over everything.

Mr. SLEMP. But that is a long way to be from home, and they would have to come down.

Gen. MITCHELL. There is not over 300 miles of water as the maximum stretch between the American Continent and Europe. If you go from Labrador to Greenland, and then by way of Iceland to the north of Great Britain, you will have only 300 miles as the maximum stretch of water.

Mr. SLEMP. But, in order to operate with aircraft over that route, they would have to have repair stations and stations for the furnishing of supplies, matériel, etc., all along there?

Gen. MITCHELL. The stations could be selected ahead of time, and nothing could prevent them from bringing supplies by dirigible. Dirigibles carry a useful load of 20 tons, and 20 tons per day will

keep 2,000 planes in commission. That same dirigible can carry 200 Infantrymen——

Mr. SLEMP (interposing). Two hundred Infantrymen would not be much of a force.

Gen. MITCHELL. But you could make two or three trips of that sort in a day, and the dirigibles would be able to maintain the line of communication all right.

Mr. SLEMP. I suppose the commercial development of types of aircraft will be so great that the Government will derive a considerable advantage without cost for which it would ordinarily have to expend money, will it not?

Gen. MITCHELL. Not until they have first been shown the way by the Government.

Mr. SLEMP. If you are not careful you will argue yourself out of the stations for Panama and Hawaii.

Gen. MITCHELL. Every element of the Air Service, on account of its great mobility, capable of reaching any part of the country very quickly. At some places, of course, it must be supported. The whole question of the seacoast defense of this country, from the air standpoint, is like a position in readiness with the observation units on the line, and the pursuit, attack, and bombardment held in masses at central points.

ESTABLISHMENT, CONSTRUCTION, ENLARGEMENT, OR IMPROVEMENT OF
AVIATION STATIONS, SEACOAST DEFENSES, HAWAIIAN ISLANDS.

Mr. SLEMP. For the establishment, construction, enlargement, or improvement of aviation stations for use in connection with the seacoast defenses of the Hawaiian Islands, etc., you have an estimate of \$2,746,062. It appears that that estimate has been reduced to \$2,294,947.

Gen. MENOHER. Yes, sir.

Mr. SLEMP. How did you reduce it?

Gen. MENOHER. By eliminating some buildings.

Mr. SLEMP. Have you any money on hand?

Gen. MENOHER. There was appropriated \$600,000 by the fortification act of 1917. There have been obligations amounting to \$297,953.11; reservations amounting to \$286,077.93; leaving a free balance of \$15,968.96.

Mr. SLEMP. What were the expenditures, obligations, and reservations for?

Gen. MENOHER. The items are: Sea sleds, \$34,281.72; for construction of temporary buildings, \$14,778.79; for operation and maintenance, \$15,000; for construction of temporary buildings, \$42,318.42; for construction of seaplane hangars and runway, \$12,986.32; construction of temporary buildings, \$13,702.79; for construction of seaplane hangars and runway, \$57,013.68; for the maintenance and extension of flying field at Luke Field, Fords Island, \$40,000; crop destruction, \$10,180.45; maintenance and operation of Luke Field, \$5,000; temporary hospital and dispensary, Luke Field, \$1,500; miscellaneous items, including machinery, tools, radio apparatus, engine parts and spares, \$51,190.94. Those are the items obligated. The reservation items are: Construction of technical building, including hangars, repair shop, etc., \$255,350;

two motor sailing launches, \$12,500; generator parts, \$275; and engine parts, \$8,962.93. Those are the larger items. There have been about \$500,000 spent on construction. The rest of it is for maintenance and operation.

FORDS ISLAND, PEARL HARBOR.

Mr. SLEMP. Where is that station located?

Gen. MENOHER. On Fords Island, which is in Pearl Harbor.

Mr. SLEMP. How many acres of land do you occupy?

Gen. MENOHER. We have the whole island. The number of acres is 237.

Mr. SLEMP. Is that an island out in the sea?

Gen. MENOHER. No, sir; it is an island in Pearl Harbor, right alongside the naval station there.

Col. FULLER. It is an island in the middle of Pearl Harbor.

Gen. MENOHER. We occupy it jointly with the Navy. Going back to the financial statement, there was obligated and expended of the Air Service military appropriation for 1919 \$118,914.34, and there was expended for land \$235,262 from Signal Corps funds. One-half of that the Navy pays for, or \$117,000.

Mr. SLEMP. What are the topographical features of Ford's Island?

Gen. MENOHER. It is practically level, of coral-rock formation, with a growth of tropical brush upon it.

Mr. SLEMP. Is practically all of the surface suited for aviation purposes?

Gen. MENOHER. It is very good; yes, sir.

Mr. SLEMP. How many airplanes have you there?

Gen. MENOHER. I am going to give that in a statement.

The expenditures, obligations, and reservations shown above will provide the following at Fords Island, Luke Field:

Preparation of aviation fields, barracks for one squadron, quarters for two officers, hangars, shops, storehouses, seaplane runways for three squadrons. Field equipment, machine tools, and operating expenses not itemized.

Mr. SLEMP. What number of men constitute a squadron?

Gen. MENOHER. For the insular garrison, 200 in round numbers.

Mr. SLEMP. How many planes?

Gen. MENOHER. That depends upon the type of the squadron. A squadron consists of 12 airplanes generally, and we will have that many at each of the coastal stations.

Mr. SLEMP. Then, you will have at Fords Island 12 heavier-than-air machines.

Gen. MENOHER. I am coming to that in a moment. The estimate for Fords Island is \$2,294,947, and this estimate will provide for the remainder of the construction required for the following garrison—

Mr. SLEMP (interposing). I want to get a statement of your present equipment there, or a statement of what you have there now, without the expenditure of another cent of money. How many airships, balloons, hangars, etc., have you there? That takes into consideration the money you have spent.

Gen. MENOHER. There will be no balloon station there. There will be a balloon base there, but neither station is on Fords Island.

Mr. SLEMP. You have balloon bases there?

Gen. MENOHER. Yes, sir; one at Fort Ruger and the other at Fort Kamehameha. Fort Kamehameha is at the eastern side of the harbor entrance, and Fort Ruger is at Diamond Head. Both are on Government-owned land.

Col. MACDILL. The present estimate provides for four squadrons. We have now stationed there two squadrons, and there has been equipment sent there for these two squadrons of land planes.

Mr. SLEMP. Twenty-four planes?

Col. MACDILL. The number actually there—we sent out enough for the two squadrons and 100 per cent reserve, and some of it is still en route. That is, 12 planes is the complement for a squadron, with a reserve of 100 per cent. Now, these two squadrons are living in tents at the present time. We have three officers' quarters. We have erected hangars for temporary quarters, which will provide for the storage, but they are not set up. We have a reservation and a project under consideration by the War Department—and when I say under consideration, I mean they are still thrashing out some of the minor details, in order that it may exactly correspond to that which the War Department has assented to in the total, but they have not the exact details for it—that is, projects for maintaining buildings for these troops; but, due to the fact that the appropriation does not legally allow barracks and quarters to be built, we have not been able to provide the barracks at all for the personnel, with the exception of three officers' quarters, which were authorized from the appropriation for the Air Service, military, 1919.

Mr. SLEMP. Have you any appropriation for Fords Island from any other source than from this committee?

Col. MACDILL. Yes, sir; from the Air Service, military, 1919.

Gen. MENOHER. \$118,000 was expended from Air Service, military, 1919.

Mr. SLEMP. Do you expect to get any money from that source next year?

Col. FULLER. This was a war expenditure—during the war.

Mr. SLEMP. You have not had any money since 1918 from this source?

Gen. MENOHER. No, sir.

Mr. SLEMP. You must have paid for the land out of the \$600,000 appropriation?

Gen. MENOHER. \$235,000 for land, but half of that comes from the Navy and then it reverts to the Treasury. The proposition is to have at this field one group headquarters—a group is two or three squadrons—a photo section, an air park company, two observation squadrons, and one pursuit squadron. Then, in addition to that it is considered that the reasonable air service for the garrison for the island of Oahu should include three pursuit squadrons and a bombardment squadron with the necessary headquarters, but no estimate is made for that this year.

Mr. SLEMP. Where will they be placed?

Gen. MENOHER. We are contemplating the establishment of a station at Scofield Barracks for the organizations that can not be accommodated at Fords Island. Scofield Barracks is where there is a

large Army post. It is about 9 or 10 miles in a direct line from Pearl Harbor; by rail it is about 15 or 20 miles.

Mr. SLEMP. It seems here, General, that you have in mind three stations, Fords Island, Fort Kamehameha, and Fort Ruger.

Gen. MENOHER. Fort Kamehameha is to east of Pearl Harbor entrance, and that is for balloons only. The other balloon station for that base line is at Fort Ruger, which is near Diamond Head. It is to the east of the city of Honolulu, whereas Pearl Harbor is to the west of Honolulu, so that if you consider each end of the balloon base line as a station, of course, it means three stations there, just as in the other project in the United States we have at the entrance of Narragansett Bay an operating station at Saunderstown and then a balloon base line, one end of which is at Fort Kearney and the other over to the east of Newport, at Satchuset Neck.

Mr. SLEMP. The cost of Fords Island station is larger than a corresponding station in the United States.

Col. FULLER. I will state that the one to which we have referred accommodates only one squadron.

Gen. MENOHER. Whereas this proposition is for three squadrons.

Mr. SLEMP. Why is it that the sum of your items in this bill does not equal \$1,640,625? What have you left out of the itemization?

Col. FULLER. The itemization in the bill for individual structures is to obtain authority only for the construction of those buildings on which there is a legal limit. For instance, no buildings of any kind can be constructed costing more than \$20,000 without specific authority of Congress.

Mr. SLEMP. That same argument applies to the items below?

Col. FULLER. Yes, sir.

Mr. SLEMP. Is there any difference in the cost of the structures at these places from what was submitted to this committee some years ago?

Col. MACDILL. The proposition that was submitted to the committee last year was based solely and entirely on duplicating the stations in the United States, simply multiplying the stations in the United States by the number of squadrons, whereas the proposition this year is a proposition worked out on an exact number of buildings and the exact cost of constructing those buildings in Hawaii, worked out by the department commander and by the people in Hawaii as to the exact amount of construction.

Gen. MENOHER. You see, each one of these projects in the insular possessions and the Panama Canal was made the subject of careful study by the department commander on the ground with his staff. Now, we consider that the reasonable Air Service garrison should include three more pursuit squadrons and one bombardment squadron, but we are not estimating for that now. We are estimating now for three squadrons, two observation and one pursuit squadron only.

Mr. SLEMP. You are making it of more assistance to your coast defense?

Gen. MENOHER. Yes, sir.

Mr. SLEMP. Rather than part of the offensive organization of the Army?

Gen. MENOHER. Yes, sir. Later, I think, we will have to come to the other proposition.

Mr. SLEMP. You begin on the second line of defense, according to Gen. Mitchell, which will be through the air?

Gen. MENOHER. Yes, sir.

BALLOON STATIONS.

Mr. SLEMP. Are those balloon stations located on land owned by the United States?

Col. FULLER. Except near Kamehameha. It is \$105,000 for the purchase of land.

Mr. SLEMP. My conception of balloons would fall so far short of these appropriations that perhaps I have it wrong. Your principal need for balloons at all is for the observation that you would get by having them with the artillery?

Col. FULLER. Yes; by range triangulation methods.

Mr. SLEMP. You would just have three balloons for that purpose?

Col. FULLER. Yes, sir.

Gen. MENOHER. We observe and get the deflection at the target, read the angles, convert them, and plot them.

Mr. SLEMP. You would not need to have many observers in those balloons, would you?

Gen. MENOHER. No, sir. A balloon company for coast-defense use in the insular possessions consists of 9 officers and 176 enlisted men.

Col. FULLER. The observers observe from a height of about 3,500 feet.

Mr. SLEMP. They are attached to the ground, of course?

Gen. MENOHER. Yes; by a cable and winch.

Col. FULLER. In the long-range work of the Artillery it is very essential.

Mr. SLEMP. It is going to cost nearly \$1,000,000 to prepare and house one of those balloons?

Gen. MENOHER. Oh, no, Mr. Slemp; not \$1,000,000 for one balloon company.

Col. FULLER. All complete for one balloon, you will find that at Fort Ruger it is \$234,437 for that one balloon company.

Mr. OGDEN. Colonel, in regard to the purchase of 31 acres of land at \$105,000, I notice in the hearings of last year that a question was asked by Mr. Byrns: "Have you the land there already, or will you have to purchase it?" And Col. Patterson replied: "No; we have the land." That is on page 165 of the hearings.

Col. FULLER. That is at Fort Kamehameha. That whole project was submitted last year without the matter being carefully studied on the ground. This project has been carefully studied by the department commanders on the ground and they were instructed that if possible these balloons were to go on the Fort Kamehameha Reservation, but it was found that in order to get space on the Kamehameha Reservation it would require an expenditure for a fill which exceeded the cost of this land just off the reservation.

Mr. BYRNS. I think, Mr. Ogden, if you will read the preceding answer and also the succeeding answer in the hearings, you will find that he meant Fords Island.

Mr. SLEMP. Have you investigated the Government structures in the United States around aviation training places for hangars, etc.,

for the purpose of taking a lot of that material over there and installing it?

Gen. MENOHER. I have been to most of the aviation stations in the country with the exception of one or two that have been abandoned, and little or no construction can be removed to another place. It is frame, with no foundation, blocked up, and although the buildings, if they are taken care of, will last for 15 or 20 years, they are frame and of light construction.

Mr. SLEMP. We have beautiful buildings over at Brest.

Gen. MENOHER. We have certain hangars. The expeditionary hangars are of all-steel construction and they can be moved from one place to another.

Mr. SLEMP. Have you looked into that?

Gen. MENOHER. We have had requests for those buildings for outside activities and we have declined to consider them because we need all we have.

Mr. SLEMP. Have you made a careful investigation of the facilities you have in the United States for the purpose of using some of the buildings or material over there?

Gen. MENOHER. I refer now to these frame buildings. We have at Fords Island some of the expeditionary hangars now. They are all metal construction. You would get about 90 per cent of salvage out of them. Out of the frame buildings you would only get 10 or 15 per cent salvage.

Mr. SLEMP. Have you got your relations with the Navy entirely worked out with reference to this Fords Island proposition?

Gen. MENOHER. In all essential features, yes. It has been settled that the Army is to remain on the island and that sufficient area is to be set aside for the accommodation of the facilities necessary in our work with the coast artillery. The actual physical line of division is now before the aeronautical board, which will insure coordinated action between the Army and Navy.

Mr. SLEMP. From the standpoint of the location of Fords Island with reference to the fortification units there in the use of planes for observation purposes in connection with artillery fire is Fords Island a satisfactory location for the Army?

Gen. MENOHER. Yes, sir; and we need it for that purpose.

Mr. SLEMP. Can you get the personnel backward and forward from your station to the artillery centers?

Gen. MENOHER. We have telephone communications there. We do not need the personnel of the Air Service at the station.

Gen. MITCHELL. We can get the observers from Fords Island very quickly.

Gen. MENOHER. Yes; that is easy. I may say that the joint board of the Army and Navy has approved our estimates for the Army installation at Fords Island. The Navy has not done anything.

Mr. SLEMP. Would half the money that has been put up here be paid by the Navy in the end?

Gen. MENOHER. No, sir; it is for us alone.

Mr. SLEMP. So that you would have about 125 acres of land that belongs to the Army without any part of it belonging to the Navy?

Gen. MENOHER. It would have to be decided in this way, that a certain large part of the island would be set apart for a landing field, upon which nothing would be built, and that would be used in

common by the Army and the Navy under regulations to be prescribed. The remainder would be used for buildings, etc. It would be apportioned between the two.

Mr. SLEMP. When you were describing buildings awhile ago, were you describing any buildings that belonged to the Army and Navy both?

Gen. MENOHER. None at all. None belong to the Army and Navy both. The Navy has nothing there in the way of buildings.

Mr. SLEMP. Now, in regard to these balloons, have you armament range of which is such that balloons are a necessity?

Gen. MENOHER. Yes, sir.

Mr. SLEMP. What units, for example?

Gen. MENOHER. There have been either already landed or are in contemplation guns of 12-inch caliber. I know they have 12-inch calibers at Fort Ruger.

Mr. SLEMP. Fort Ruger has a good elevation for the range of a 12-inch gun?

Col. FULLER. At Fort De Russy, near Fort Ruger, there are 14-inch guns.

Gen. MENOHER. There is no observation there at Diamond Head sufficient for a 14-inch gun.

Col. FULLER. Diamond Head is something less than 900 feet, and the balloons go up 3,500 feet and open up an entirely new field of observation, especially with reference to searchlights.

Mr. SLEMP. Of course, it would not make any difference how far out you could see if your 12-inch gun would not reach it.

Col. FULLER. This is the 14-inch gun.

Mr. SLEMP. Then this item has reference to the 14-inch gun?

Col. FULLER. Yes; and then they have installed what is commonly called the long-range 12-inch gun on a barbette mount, with a maximum range of 27,000 yards.

Gen. MITCHELL. It makes no difference what the size of your gun is, if you have the balloons you are better off for observation. It makes no difference whether your range is 8,000 or 10,000 yards.

Col. FULLER. Down at Fort Monroe last year when you could not see anything from the shore stations at all, the balloons conducted target practice in an excellent manner. There was a low-lying haze and nothing could be seen from the ground, but from 3,000 to 3,500 feet up in the air, looking down, the balloon could make observations.

Col. MACDILL. The stations at Fort Ruger and Fort Kamehameha are assisting in the work of the whole harbor defense.

Mr. SLEMP. Just give an itemized statement of the buildings and the structures, with the cost of the buildings.

Col. FULLER. It is as follows: For the establishment, construction, enlargement, or improvement of aviation stations for use in connection with the seacoast defenses of the Hawaiian Islands, including the acquisition of land or any interest in land by purchase, lease, condemnation, or otherwise, and the preparation necessary to make the same suitable for the purpose intended, at or in the vicinity of Fords Island, at a cost not to exceed \$1,330,510, including as a part thereof the following structures: Four barracks, at a cost not to exceed for each, \$40,000; one post exchange, at a cost not to exceed \$30,000; two seaplane hangars, at a cost not to exceed, for each, \$87,000. At or in the vicinity of Fort Kamehameha, at a cost not to

exceed \$730,000, including as a part thereof the following structures: Two barracks, at a cost not to exceed, for each, \$40,000; one electrolytic hydrogen plant, at a cost not to exceed \$130,000. At or in the vicinity of Fort Ruger, at a cost not to exceed \$234,437, including as a part thereof the following structures: one barracks at a cost not to exceed \$40,000; for 31.47 acres of land, more or less, situated near Fort Kamehameha, at a cost not to exceed \$105,000; for twenty-three hundredths acre of land, more or less, situated on McGrew's Peninsula near Ford Island, at a cost not to exceed \$2,000; provided, that the limit of costs of structures, including officers' quarters, as fixed by existing law, shall not be exceeded in the construction herein authorized except as to structures and quarters herein specified, the limit of cost for which shall not exceed the amount herein appropriated for each, respectively.

Mr. SLEMP. Are these estimates that you are submitting this year lower or higher in cost than before?

Col. FULLER. They are lower in cost.

Mr. SLEMP. It is expected to complete all this work in the next fiscal year?

Col. FULLER. Yes, sir; we expect to. This is all for construction work, and unless we have a reasonable time, if possible, in advertising construction work, the bids have to be thrown out, and they have to be readvertised.

Mr. SLEMP. How long would it be after you got this money before you would be calling on the Government to equip the station properly?

Col. FULLER. There is nothing for the seacoast defense at all.

Mr. SLEMP. How much would come out of the appropriation for seacoast defense? You would have a lot of planes and balloons.

Col. FULLER. That would come out of another appropriation.

Mr. SLEMP. I know, but how much would it amount to? In other words, I am trying to get at how much this whole thing means to the Government. You have sufficient equipment on hand in the United States properly to equip these stations?

Gen. MENOHER. Yes; but it is not of the latest type. We have nothing of the very latest type in planes.

Mr. SLEMP. Have you any observation planes?

Gen. MENOHER. We have the De Haviland planes, which are used as observation planes. That is not a modern type.

Mr. SLEMP. Have you any pursuit planes?

Gen. MENOHER. None, except some foreign planes.

Mr. SLEMP. Have you any pursuit planes that carry 1,000-pound projectiles?

Gen. MENOHER. We have 10 Martin bombing planes that carry 1,000 pounds of bombs each.

Mr. SLEMP. That would be 72 altogether?

Gen. MENOHER. Yes; 72 for the three squadrons planned for Luke Field. One of them would be a pursuit squadron. This number of planes includes 100 per cent reserve.

Mr. OGDEN. In a very general way, what would be the annual operating expense of the station?

Gen. MENOHER. I can not give you that figure now.

Col. FULLER. Our estimates are all divided up on this basis. In presenting the estimates for aviation stations in the United States the Military Affairs Committee wanted the item of maintenance of physical plants and buildings as a separate item, and for the operation of the planes themselves we compute that in thousand hours of flying, and various other maintenance items affecting the various departments of the War Department were divided up with reference to those various activities, rather than to the proposition of saying one squadron costs so much and another squadron costs so much, so that it would be very difficult to say what the total operating expense of this would be until we made a separate estimate on it.

Mr. OGDEN. You could not give it just in a general way? Of course, I know the difficulty that you have in being exact about it.

Col. FULLER. Well, Col. Fickel says he has figures which show the cost of operation of one squadron on the western front. Of course, that would be quite an imperfect basis for this purpose.

Lieut. Col. FICKEL. The approximate cost of equipping and the operation of an observation squadron for one year on the western front was \$3,000,000, including items the cost of which are borne by the Quartermaster Corps.

Col. FULLER. Of course, that is due to the destruction due to the war.

Mr. SLEMP. General, we do not have any of our fortifications in the Continental United States equipped with balloon facilities except a possible use of balloons at Langley Field; nor have we any of our coast defenses equipped with heavier-than-air machines?

Gen. MENOHER. No, sir; not yet.

Mr. SLEMP. But your suggestion in regard to Hawaii is on a line with the suggestion made this morning in regard to the Continental United States?

Gen. MENOHER. Yes, sir.

Mr. SLEMP. Now, these buildings that you propose to construct are wooden, or frame, or brick, or what?

Gen. MENOHER. They are built in the same style as the other buildings in Hawaii. They have various constructions out there; I am not certain just what it is. They have, for instance, a stucco construction.

Col. FULLER. Here are some photographs showing the various types of construction [indicating].

Mr. SLEMP. When you ask for a post exchange to cost \$40,000—

Col. FULLER (interposing). \$30,000, at Fords Island.

Mr. SLEMP. Not to exceed \$30,000. Is that to be a frame building?

Col. FULLER. Yes, sir.

Mr. SLEMP. Is not that rather expensive?

Col. FULLER. It is of very light construction, frame construction. The type of construction in the United States is a cheaper and simpler type of construction.

Mr. SLEMP. You have to import all the lumber, do you?

Col. FULLER. Yes, sir.

Gen. MENOHER. That is a type of construction that is quite common out there [indicating]. It is the effort of the Construction Division to follow in a general way the construction of types that they find suitable for that climate. This photograph shows the types that they find suitable for this climate. This photograph shows a shingle construction.

Mr. SLEMP. Is there anything else that you can add to elucidate this subject, General, if we have overlooked anything?

Gen. MENOHER. I do not think of anything else.

Mr. SLEMP. Of course, the general strategic importance of Oahu is admitted by everybody.

Gen. MENOHER. Yes; it is very great.

PURCHASE, MANUFACTURE, MAINTENANCE, AND OPERATION OF AIRSHIPS,
PANAMA CANAL.

Mr. SLEMP. Now, we will take up your Panama Canal item. For the purchase, manufacture, maintenance, and operation of airships you ask \$100.

Col. FULLER. That is simply to continue the wording of the operating item.

Mr. SLEMP. That is to be used in connection with the item on the next page for which you ask \$6,132,723?

Gen. MENOHER. No, sir; it is a different item entirely.

Mr. SLEMP. Will you make a statement of what money you have on hand under this \$100 item?

Col. FULLER. There is no balance under that item.

Mr. SLEMP. Have you ever had any money expended out of that item?

Gen. MENOHER. I have a statement prepared in connection with the Panama fortifications which I will insert in the record.

(The statement referred to is as follows:)

1. *Former appropriations.*—(a) The fortification act approved June 12, 1917, appropriated \$500,000 for the purchase of aeronautical equipment and the construction of technical buildings in connection with the seacoast defenses at the Panama Canal, with the proviso that the construction of the buildings thereunder should be performed under the direction of the Governor of the Panama Canal Zone. This appropriation has been entirely expended or obligated.

NOTE.—Approximately one-half of the expenditure noted above was applied to the clearing and hydraulic fill of the present site at France Field, the remainder of the expenditure was applied to the construction of the necessary technical buildings and hangars for the equipment of one aero squadron with both land and water equipment.

(b) There has also been spent in the Canal Zone a total of \$434,130 from "Air Service, military, 1919 and 1920," for the construction of barracks and quarters for the present garrison, which consists of one squadron and one photo section, and for the necessary maintenance and operating expenses incidental to the operations of this squadron to date.

(c) There was also spent a small sum amounting to \$28,817.83 out of "Signal Corps, 1916 and 1917," which was principally devoted to incidental maintenance and civilian labor between 1917 and 1918.

(d) The foregoing makes a grand total of approximately \$962,947.83 spent at Panama in connection with the aerial defense of the Canal Zone.

2. *Estimates, 1921.*—(a) An appropriation of \$6,132,723 is requested under the fortification act, fiscal year 1921, and provides for the necessary construction for increase of the Air Service garrison at Panama to a total of two group headquarters, two observation squadrons, three pursuit squadrons, one park company, one photo section, three balloon companies—total, 300 officers and 1,914 men.

(b) In this connection it should be noted that it has been impossible to find sites in the Panama Canal Zone which could be adapted to aviation uses without great expense. There are a considerable number of flat salt marshes that can be prepared for use by filling. Of these possible locations the site at France field and Balboa fill have been selected as the cheapest, and most of the new construction requested is concentrated at these two sites.

(c) The construction contemplated comprises the necessary additional accommodation for, at France field, 1 pursuit squadron; at Balboa fill, 1 group headquarters, 1 observation squadron, 2 pursuit squadrons, 1 park company, 1 photo section; at Fort Sherman, Fort Randolph, and Corundu Hill, 1 balloon company each.

(d) It should also be noted that the board of officers convened to make a study and report upon tactical needs of Panama Canal Zone in connection with aerial defense, recommended for a complete defensive project a total of 2 hydro-airplane squadrons, 1 reconnaissance group, 1 day bombing group, 2 night bombing squadrons, 6 pursuit squadrons, 1 park company—total, 18 squadrons and 1 park company.

For various important reasons it is considered impossible to provide for this entire project at this time, but the provision requested in the fortification bill, fiscal year 1921, is coordinated with the larger and ultimate project desired for the Panama Canal Zone.

Mr. SLEMP. In connection with the appropriation of \$500,000 in the fortification act of 1917, which has been entirely expended or obligated, you are not asking for any more under that item?

Gen. MENOHER. No, sir.

FRANCE FIELD, PANAMA CANAL.

Mr. SLEMP. Where is France Field?

Gen. MENOHER. It is at the eastern end of the canal.

Mr. SLEMP. What is the acreage of that field?

Gen. MENOHER. About 1,000 yards square.

Mr. SLEMP. Between 150 and 200 acres?

Gen. MENOHER. Yes, sir.

Mr. SLEMP. Does that have a frontage on the water there?

Gen. MENOHER. Yes, sir.

Mr. SLEMP. Does the Navy use it in connection with the Army?

Gen. MENOHER. Yes, sir. They are down at the other end of the field, to the southwest.

Mr. SLEMP. But part of the same field?

Gen. MENOHER. Yes; part of the same field. They have a submarine base also at that end.

Mr. SLEMP. Have you a balloon station down there now?

Gen. MENOHER. No, sir.

Mr. SLEMP. You have no balloons?

Gen. MENOHER. No, sir.

Mr. SLEMP. Will you give your aeroplane equipment?

Col. MacDILL. We sent down planes for four squadrons and stored them there temporarily and we have in complete operation there one squadron.

Mr. SLEMP. So far as observation of fire is concerned in both Hawaii and the Panama Canal, you have certain types of aeroplanes for that purpose?

Gen. MENOHER. Yes, sir.

Mr. SLEMP. Do you need aeroplanes at either Hawaii or Panama for purposes connected with the observation of fire and range finding. You have enough airplanes in both of those places for that purpose?

Col. MacDILL. I will answer your question, but may I speak about something else first. The proposition of Panama is practically a proposition of ground defenses first. What I mean by ground defenses is a provisional aviation at France Field; the portion that is

clear now and ready for action, is very small. In fact, a committee of Congress that was down there looked it over and said it was a shame to make them operate from that section of the field. Therefore, the first thing is to get the aviation field cleared up and made larger.

Mr. SLEMP. How much money do you expect to spend on preparing France Field?

Col. FULLER. \$1,090,935.

Col. MACDILL. That is for the whole project of France Field.

Mr. BYRNS. General, you spoke of having made a fill in France Field last year. Is that the sanitary fill that was requested last year, of which the Navy was going to bear half the expense, at Coco Solo Point?

Gen. MENOHER. No, sir. That is different. That has not been carried through.

Col. MACDILL. The proposition for a sanitary fill was one to clear out the fresh-water marshes down there. It was contemplated in connection with this fill, in cleaning out that fresh-water marsh, that they would clear around the aviation field. Now, under this estimate, in order to reduce expenses, we have simply put in a proportion of that expense that had to do with the clearing of the aviation field. Only a portion of the sanitary fill was necessary to get this aviation field fixed up.

Mr. SLEMP. You are not going to get any help from the Navy Department in that connection?

Col. MACDILL. No, sir.

Mr. SLEMP. So far as the observation of fire is concerned, you are well equipped both in Hawaii and in Panama?

Col. MACDILL. We are only equipped on one side of the Isthmus, and that is on the Atlantic side. We have no airdrome on the Pacific side at all, and the distance across the Isthmus is so great that with the present type of ship it is a very difficult matter.

Mr. SLEMP. Not if you had a range of 500 miles?

Col. MACDILL. I mean with the present type of observation ships, when you take up the question of observation of fire of coast artillery—

Mr. SLEMP (interposing). I am trying to get at the policy that the aviation department has in mind, and as I understand it, it is that while you have enough for observation purposes, you wish to enter into this larger and broader field of aviation defense; that is, attacking the enemy out in the ocean. Is not that right, General?

Gen. MITCHELL. Answering your question directly, Mr. Slemp, there is equipment down there which was left over from the war, which was designed for observation work with mobile units of the Army, and it is now being adapted for use with the Artillery. It is not suitable for regular observation work.

Mr. SLEMP. The point I am trying to get at is whether this committee wishes to go out into the use of aeroplanes in the Hawaiian Islands and in Panama, corresponding to a second line of defense.

Gen. MITCHELL. You could not consider aviation as a defense at any of these places at the present time. It is only an auxiliary of the Coast Artillery.

Mr. SLEMP. Even with the facilities that we have there now?

Gen. MITCHELL. Yes; it is only about 50 per cent efficient.

Mr. SLEMP. And that is because we have not the material to send down there which we ought to send?

Gen. MITCHELL. Yes, sir.

Col. FULLER. There is no landing field prepared over on the other side, and in France Field if the engine goes dead there is no place to land. Several have been killed down there in that way.

Mr. SLEMP. How much will it cost to prepare France Field?

Col. MACDILL. For the extension of the flying field, \$230,000.

Mr. SLEMP. How long will it be before you complete the work on that field?

Col. MACDILL. Well, judging from the other side, which took about 8 months, I think it would be about 34 months on the Pacific side, because this is a much larger undertaking.

Mr. SLEMP. You would not have much time to install the buildings?

Col. MACDILL. The buildings could go up at the same time.

Mr. SLEMP. They are in different parts?

Col. MACDILL. Yes, sir.

Col. FULLER. With reference to Oahu, while there are observation squadrons there now, there is no proper accommodation to take care of them. They are under canvas.

Mr. SLEMP. General, will you put in the record an itemized statement of this \$6,130,000 estimate?

Gen. MENOHER. Yes, sir.

Mr. SLEMP. With the cost of each article?

Gen. MENOHER. Yes, sir. That is already prepared to submit. (The statement referred to is as follows:)

ARMY AIR SERVICE.

PANAMA PROJECT.

PERSONNEL.

Present.—1 group headquarters, 1 observation squadron, 1 photo section—total, 19 officers and 173 men.

Proposed.—2 group headquarters, 2 observation squadrons, 3 pursuit squadrons, 1 park company, 1 photo section, 3 balloon companies—total, 300 officers and 1,914 men.

France Field, present.—1 observation group headquarters, 1 observation squadron, 1 photo section—total, 19 officers and 173 men.

France Field, proposed.—1 observation group headquarters, 1 observation squadron, 1 pursuit squadron, hydroequipment—total, 103 officers and 457 men.

Balboa fill, proposed.—1 pursuit group headquarters, 1 observation squadron, 2 pursuit squadrons, 1 park company, 1 photo section—total, 170 officers and 929 men.

Fort Randolph, proposed.—1 balloon company—total, 9 officers and 176 men.

Fort Sherman, proposed.—1 balloon company—total, 9 officers and 176 men.

Corundu Hill, proposed.—1 balloon company—total, 9 officers and 176 men.

CONSTRUCTION.

In the following estimates concrete construction is intended for all principal buildings. Although frame construction would show a 25 per cent initial savings, experience has proven that this type of construction deteriorates very rapidly in the Canal Zone.

France Field.—Present personnel: 1 group headquarters, 1 observation squadron, 1 photo section—total strength, 19 officers and 173 men. Proposed personnel: 103 officers, 457 men, 1 group headquarters, 1 observation squadron, 1 pursuit squadron, hydroequipment.

Item.	Estimate as originally submitted.	Revised estimate.
Barracks and quarters:		
2 field officers' quarters.....	\$40,000	\$40,000
2 captains' quarters (2 officers each).....	44,000	44,000
1 lieutenant's quarters (4 officers each).....	30,000	30,000
3 unmarried officers' quarters (10 officers each set), total 30 officers.....	135,000	135,000
1 barracks for 200 men.....	70,000	70,000
Total.....	319,000	319,000
Technical building:		
Technical storehouse.....	15,000	15,000
Dope shop and fabric shop.....	5,000	.....
Radio repair shop.....	5,000	.....
Armory and dope, fabric, and radio repair shop.....	.....	16,000
Remodeling 11 seaplane hangars.....	75,000	75,000
Erection of seaplane hangar.....	15,000	.....
Boat house stalls (2 additional).....	.....	5,000
Total.....	115,000	111,000
General buildings:		
1 fire station.....	3,000	3,000
1 laundry.....	3,000	.....
Total.....	6,000	3,000
Special structures:		
Addition to garage.....	3,000	6,000
1 administration building (including post exchange, assembly hall, guardhouse, and 10-bed infirmary).....	60,000	60,000
1 quartermaster's storehouse.....	31,000	18,000
Total.....	94,000	84,000
Utilities:		
Dry fill and grading around buildings.....	38,665	40,000
Street lighting.....	12,000	12,000
Municipal works.....	79,185	80,000
Addition to sea wall.....	35,000	35,000
Total.....	164,850	167,000
Preparation of flying fields:		
Extension of flying field.....	230,000	230,000
Emergency landing field.....	9,000	9,000
Total.....	239,000	239,000
For overhead and contingencies.....	241,570	167,935
Joint Army and Navy fill.....	270,000	.....
Grand total.....	1,449,420	1,090,935

RECAPITULATION (FRANCE FIELD).

Barracks and quarters.....	\$319,000
Technical buildings.....	111,000
General buildings.....	3,000
Special structures.....	84,000
Utilities.....	167,000
Preparation of flying fields.....	239,000
For general overhead and contingencies.....	167,935
Total revised estimate.....	1,090,935
Total original estimate.....	1,449,420
Total reduction.....	356,485

BALBOA FILL.

PERSONNEL.

Present.—None.

Proposed.—170 officers, 929 men, 1 group headquarters, 1 observation squadron, 2 pursuit squadrons, 1 park company, 1 photo section.

Item.	Estimate as originally submitted.	Revised estimate.
Barracks and quarters:		
5 field officers' quarters, 38 by 45 by 36 6.....	\$100,000	\$100,000
4 sets captains' quarters, 40 by 45 by 43 6 (2 officers each).....	88,000	88,000
4 bachelor sets (40 officers), 38 by 83 by 37.....	180,000	180,000
8 sets lieutenants' quarters, 36 by 90 by 35 (4 officers each set).....	240,000	240,000
1 officers' mess, 30 by 70 by 20.....	20,000	20,000
9 noncommissioned officers' quarters (4 families each set), 30 by 75 by 31.....	180,000	180,000
4 sets barracks, 66 6 by 142 by 34 6.....	280,000	280,000
Total.....	1,088,000	1,088,000
Technical buildings:		
Shops, 100 by 300 by 20.....	100,000	110,000
Storehouse, 100 by 300 by 32.....	100,000	110,000
Hangars, 100 by 110 by 20 (3 squadrons).....	270,000	270,000
Dope shop, 60 by 100 by 15.....	18,000	.....
Technical buildings:		
Salvage shop, 35 by 100 by 15.....	10,000	.....
Transportation, dope, and salvage shop.....	.....	49,000
Test shop, 20 by 60 by 15.....	2,500	2,500
Gasoline and oil, 10,000 gallons: gasoline, storage, 5,000 gallons: oil, local.....	10,000	10,000
Radio and photo.....	15,000	15,000
Repair shop, 40 by 120 by 15.....	20,000	.....
Armory, 40 by 60 by 15.....	10,000	10,000
Explosives magazine, 40 by 60 by 15.....	30,000	20,000
Reserve oil storage.....	6,000	.....
Reserve gasoline storage.....	50,000	.....
Reserve oil and gasoline storage.....	.....	20,000
Total.....	641,500	616,500
General buildings:		
1 headquarters 60 by 100 by 23.....	50,000	.....
1 guard house, 24 by 36 by 20.....	6,000	.....
Laundry, 50 by 123 by 15.....	18,000	.....
1 combination headquarters, post exchange, and guard house.....	.....	71,000
Total.....	74,000	71,000
1 post exchange, 25 by 50 by 20 (frame).....	15,000	.....
1 hospital, 38 by 110 by 21.....	31,000	31,000
Quartermaster storehouse, 60 by 150 by 15.....	36,000	24,000
Transportation repair shop 20 by 100 by 15.....	21,000	.....
Garage, 40 by 75 by 15.....	9,000	7,500
Total.....	112,000	62,500
Railroad tracks, 2,000 feet.....	10,000	10,000
Machine-gun range.....	5,000	5,000
Grading (buildings).....	102,000	102,000
Extension Corundo sewer.....	156,000	156,000
Sewer.....	22,000	22,000
Storm sewers.....	24,000	24,000
Sanitation, contiguous areas.....	20,000	20,000
Water line.....	82,000	82,000
Sidewalk.....	21,500	21,500
Roads.....	18,100	18,100
Electrical.....	100,400	110,400
Total.....	85,000	85,000
Total.....	646,000	656,000
Grading fill.....	128,300	128,300
Dry fill.....	720,000	720,000
Total.....	848,300	848,300
For overhead and contingencies.....	664,360	332,180
Grand total.....	4,074,160	3,674,480

RECAPITULATION (BALBOA FILL).

Barracks and quarters.....	\$1,088,000
Technical buildings.....	616,500
General buildings.....	71,000
Special structures.....	62,500
Utilities.....	656,000
Preparation of flying fields.....	848,300
For general overhead and contingencies.....	332,180
Total revised estimate.....	3,674,480
Total original estimate.....	4,074,160
Total reduction.....	399,680

COCO SOLO (FORT RANDOLPH) NEAR FRANCE FIELD.

PERSONNEL.

Present.—None.
Proposed.—9 officers, 176 men, 1 balloon company.

Item.	Estimate as originally submitted.	Revised estimate.
Field officers' quarters.....	\$20,000	.....
2 captains' quarters.....	22,000	\$22,000
1 set lieutenant's quarters (4 officers).....	30,000	30,000
2 sets noncommissioned officers' quarters (8 officers).....	40,000	40,000
1 barracks.....	70,000	70,000
Storehouse.....	15,000	15,000
2 balloon sheds (42 by 100 by 40).....	100,000	100,000
Roads (3,750 feet).....	35,750	35,750
Grading and fill.....	9,200	9,200
Walks.....	1,500	1,500
Water.....	11,250	11,250
Sewer.....	1,800	1,800
Electrical.....	17,000	17,000
For overhead and contingencies.....	74,700	37,350
Total.....	448,200	390,850

RECAPITULATION (COCO SOLO—FORT RANDOLPH).

Barracks and quarters.....	\$162,000
Technical buildings.....	115,000
Utilities.....	76,500
For general overhead and contingencies.....	37,350
Total revised estimate.....	390,850
Total original estimate.....	448,200
Total reduction.....	57,350

FORT SHERMAN (TORO POINT).

PERSONNEL.

Present.—None.
Proposed.—9 officers, 176 men, 1 balloon company.

Item.	Estimate as originally submitted.	Revised estimate.
1 field officers' quarters.....	\$21,000	.....
2 captains' quarters.....	25,000	\$24,200
1 set lieutenants' quarters (4 officers).....	39,000	33,000
2 sets noncommissioned quarters (8 officers).....	45,000	44,700
1 barrack.....	70,000	77,000
Total.....	190,000	178,200
2 balloon sheds (42 by 100 by 40), frame.....	109,000	110,000
Storehouse.....	15,000	16,500
Total.....	115,000	126,500
Garage.....	5,000	5,500
Roads (2,000 feet).....	14,000	14,000
Grading.....	2,800	2,800
Walks (1,600 square yards).....	3,200	3,200
Water lines (1,800 feet).....	4,200	4,200
Sewers (2,200 feet).....	4,380	4,380
Sanitation, contiguous areas.....	6,800	6,800
Electrical.....	26,000	26,000
Total.....	61,380	61,380
For overhead and contingencies.....	74,256	37,128
Grand total.....	445,636	408,708

RECAPITULATION (FORT SHERMAN—TORO POINT).

Barracks and quarters	\$178, 200
Technical buildings	126, 500
Special structures	5, 500
Utilities	61, 380
For general overhead and contingencies	37, 128
Total revised estimate	408, 708
Total original estimate	445, 686
Total reduction	36, 928

CORUNDU HILL.

PERSONNEL.

Present.—None.

Proposed.—9 officers, 176 men, 1 balloon company.

Item.	Estimate as originally submitted.	Revised estimate.
1 field officers' quarters	20, 000	.....
2 captains' quarters	22, 000	22, 000
1 set lieutenants' quarters (4 officers)	30, 000	30, 000
2 sets noncommissioned officers' quarters (8 officers)	40, 000	40, 000
1 barracks	70, 000	70, 000
Total	182, 000	162, 000
2 balloon sheds (42 by 100 by 40), frame	100, 000	100, 000
Helium repurification plant	130, 000	130, 000
Total	230, 000	230, 000
Roads (5,000 feet)	43, 600	43, 600
Grading	10, 000	10, 000
Walks (1,500 square yards)	3, 000	3, 000
Water lines (6,500 feet 6 inches)	10, 000	10, 000
Sanitation, contiguous areas	28, 000	28, 000
Sewers	6, 900	6, 900
Electrical	22, 000	22, 000
Total	123, 500	123, 500
For overhead and contingencies	104, 500	52, 250
Grand total	640, 000	567, 750

RECAPITULATION (CORUNDU HILL).

Barracks and quarters	\$162, 000
Technical buildings	230, 000
Utilities	123, 500
For general overhead and contingencies	52, 250
Total revised estimate	567, 750
Total original estimate	640, 000
Total reduction	72, 250

RECAPITULATION.

Panama fortifications revised estimate, fiscal year 1921, all projects.

Barracks and quarters	\$1, 909, 200
Technical buildings	1, 199, 000
General buildings	74, 000
Special structures	152, 000
Utilities	1, 084, 380
Preparation of flying fields	1, 087, 300
For general overhead and contingencies	626, 843
Total	6, 132, 723
Grand total original estimate as submitted	7, 057, 416
Grand total revised estimate	6, 132, 723
Reduction recommended	924, 793

Gen. MITCHELL. I would like to invite attention to one thing, and that is that in connection with certain units you may have to have a bigger field or a smaller field. As a rule, an aeroplane rolls just so far when it reaches the ground. That is the reason we have a field a certain size. Now, under ordinary conditions, if the field is disengaged we can operate a good many groups off of the same field. If there are a number of buildings on it, it is a different matter. If you have a great number of units operating on that field you have to have a corresponding number of buildings, but the size of that field is about the same; it has to be the same whether you have few or many planes.

Mr. SLEMP. That is what I have in mind, that if you are regarding aeroplanes simply as an auxiliary to the seacoast defense of Hawaii and Panama, hitting objects quite a distance from the coast, just as an assistant, without any offensive of its own, that you already have in both of those places sufficient material for the purpose, except balloons for observation, and you do not seem to have them in either place?

Gen. MITCHELL. No, sir. In other words, those insular possessions have been regarded as a complete project, because they are out of touch with the United States. If we declared war to-morrow you could not get anything to them.

Mr. SLEMP. This proposition would involve an offensive of its own on the part of the aeroplanes, and it would involve embarking on a proposition which we have not gone into in the United States.

Gen. MITCHELL. Well, we have gone into it in a rudimentary way. When it comes to observation in the face of hostile fire, you have to have pursuit groups.

Through unfortunate wording in the answers of the Air Service representatives before the committee, it is understood that the committee has gained the incorrect impression that the pursuit squadrons called for in the Panama Canal project were essentially a part of the purely aerial defense of the Canal Zone; that this part of our project was an initiation of the Air Service as the second of the three lines of national defense, to wit, (1) the Navy, (2) the Air Service, and (3) the Army.

The committee will recognize that observation units can not perform their legitimate function if subjected to attack by hostile pursuit planes through absence or insufficiency of friendly pursuit protection. It follows, then, that unless pursuit squadrons are furnished the Canal Zone contemporaneously with the observation heavier and lighter than air units the defenses of the Panama Canal can not be considered as on a war footing.

The pursuit squadrons in our project have to do with the protection of the observation units which are to be assigned to observation service with the Coast Artillery and are just as essential to the fixed defenses as are the observation units, for the latter can not function except under a comparative immunity from aerial attack gained through combat action of the former.

The impression which it was sought to convey to the committee, and which was misunderstood, was to the effect that these units would perform other useful functions in addition to wresting the command of the air from the combat planes brought against the canal by a hostile fleet, namely, the direct attack of bombardment aviation from hostile airplane carriers. The defense of the canal from such attacks must not be left to aircraft equally as slow and hard to maneuver as the enemy aircraft engaged therein, but must be performed by pursuit planes so speedy and of such offensive power as will neutralize the enemy's advantage of choosing the time and place of attack.

In the continental United States it is contemplated that pursuit protection for coast defense observation airplanes will be furnished from a few centers withdrawn from the coast. On the Atlantic coast the pursuit squadrons

serve the entire coast would be concentrated at two or three centers and rushed to the threatened point as developments warrant.

No estimate has been submitted, nor is it contemplated to submit one, to any other committee of Congress for the providing of facilities for Air Service units stationed in the Canal Zone.

It is earnestly requested that this project be considered as essential, in all its parts, to the efficient defense of the Canal Zone—the importance of which, and the inadequacy of its present aerial defense, must not be denied the most serious consideration.

Mr. SLEMP. Do you have any pursuit groups there now?

Gen. MITCHELL. No, sir; we have no pursuit planes.

Col. MACDILL. We have only one squadron, and we could not send another there, because we have no quarters for it.

Mr. OGDEN. General, as I understand it, 18 squadrons would amount to a maximum service, or, rather, the facilities of this number of squadrons would be equal to any emergency that might arise?

Gen. MENOHER. We would consider that as a reasonably adequate defense. I do not know whether it would meet every emergency.

Mr. OGDEN. Now, the fields that would be prepared under this appropriation—would they afford adequate field facilities for that number of squadrons?

Gen. MENOHER. It is possible they might have to be extended.

Gen. MITCHELL. We would not need additional field facilities for the operation of the squadrons. That is, so far as the ground is concerned.

AIR SERVICE, PHILIPPINE ISLANDS.

Mr. SLEMP. What are you asking for the Philippines?

Col. FULLER. We are only asking for a continuation of a small balance under the former appropriation.

Mr. SLEMP. What was the balance?

Col. FULLER. \$68,285.78.

Mr. SLEMP. Give us the state of your appropriation on that.

Gen. MENOHER. I will put that in the record.

(The statement referred to follows:)

PHILIPPINE ISLANDS.

No estimate for 1921. Request continuation of balances of former appropriation.

Former appropriation, fortification act, 1917----- \$600, 000. 00

Expenditures and obligations:

For construction of technical buildings for one seaplane detachment and two balloon companies at Fort Mills, P. I., allotment No. 30456-- \$367, 000. 00

For purchase of 134 leak-proof gasoline tanks, allotment No. 580040----- 80, 272. 58

For maintenance and operation of seaplane detachment at Fort Mills, P. I., allotment No. 52219 ----- 25, 000. 00

For miscellaneous tools and equipment----- 23, 368. 04

Total ----- 495, 640. 62

Reservations, equipment, and supplies for machine shop and aero repair shop:

Allotment No. 42538----- 20, 652. 29

Allotment No. 42778----- 12, 963. 12

Allotment No. 42777----- 2, 458. 19

Total----- 36, 073. 60

Total expenditures and obligations and reservations----- 531, 714. 22

Balance for continuation of project----- 68, 285. 78

This appropriation will be used for providing hangars, shops, storehouses, and seaplane runways for the following units at Fort Mills: (a) Two balloon companies, (b) one observation squadron.

Air Service activities in Philippine Islands provided from funds carried in Army appropriation act for fiscal year 1920.

Camp Stotsenburg: Barracks and quarters, hangars, storehouses, and shops for 1 aero squadron-----	\$182,600.00
Fort Mills: Barracks and quarters for 1 aero squadron and 2 balloon companies -----	141,500.00

It is proposed to submit with the Army estimates for the fiscal year 1921 an item amounting to \$1,042,525, which will provide, in addition to the foregoing, for one balloon company at Camp Stotsenburg and for the following at Paranaque: 1 observation squadron, 2 pursuit squadrons, 1 air park company, 1 photo section, 1 wing headquarters, 1 group headquarters.

Mr. SLEMP. Did you say what that amount of \$68,000 would be used for?

Gen. MENOHER. It is to be used to provide hangars, shops, and seaplane runways at Fort Mills. It consists of two balloon companies and one observation squadron. Of course, there will not be any hangars; it will be only for their maintenance.

Mr. SLEMP. You have no balloons installed there?

Gen. MENOHER. Not now; they are on the way over.

Mr. SLEMP. Have you any observation planes already there?

Gen. MENOHER. They have been shipped.

Col. MACDILL. We sent over equipment for four squadrons. That is the same type of equipment that we have had at Panama.

Mr. SLEMP. Do you have any joint arrangement with the Army and Navy as you have at other points?

Col. MACDILL. No; they have no project there.

Gen. MENOHER. The Philippine project is rather small.

Mr. SLEMP. What is our antiaircraft defense at Panama, do you know, Gen. Coe?

Gen. COE. We are installing about 20 guns there.

Mr. SLEMP. Is that the recognized number provided for the defense of the Panama Canal?

Gen. COE. No, sir; it is not. There has been no definite number fixed upon for any aircraft defenses.

Mr. SLEMP. That is on account of the recent developments in antiaircraft production?

Gen. COE. Yes, sir. It is being studied by the local authorities at this time. I would like to state, with reference to the Panama Canal especially, that the antiaircraft defense is a very weak link in our defense, no matter how many guns you may have there, on account of the vulnerability of the target.

Gen. MENOHER. And a plane flown by determined men will get in in spite of any antiaircraft defense from the ground.

Gen. MITCHELL. There are no facilities for antiaircraft barrages and searchlights, and in order to make it successful at all the whole thing ought to be put in there, because they can not work alone.

Gen. MENOHER. It seems to me that the most important project we have before us in the matter of defense is the Panama Canal, on ac-

count of its vulnerability, and everything that can be done to render it invulnerable should be done. It would not take long for an enemy plane to put the canal out of commission.

Mr. OGDEN. Would not the enemy be more inclined to direct his attention to other points?

Gen. MENOHER. I think he would more likely strike at the Panama Canal than at any other place.

Gen. MITCHELL. Take our situation right now, with the fleet in the Pacific, what would happen?

TABULATION OF STRUCTURES WHOSE ESTIMATED COST WILL EXCEED THE LEGAL LIMIT.

1. In connection with the following tabulation, it should be noted that a limit of \$9,000 has been fixed by Congress as the limit of cost of the quarters provided for an officer whose rank is below that of major; a similar limit of \$12,000 has been placed upon the cost of the quarters provided for an officer with the rank of major or above. For somewhat different reasons Congress has required that all structures costing over \$20,000 must be specifically authorized by it.

2. It is therefore necessary only to mention the increased cost of all classes of building materials and of labor in the United States to realize that these same conditions must obtain to an even greater extent in our insular possession, and that the legal limits of cost of construction fixed in prewar days must of necessity be inadequate with the present increase in the costs involved.

CONTINENTAL UNITED STATES.

Over \$20,000.—Each aero repair, at \$76,010; each storehouse and guardhouse, at \$20,952; each combination administration radio, photo and fire house, at \$53,544; each hospital, at \$34,920; each barracks (200 men), at \$110,000; each barracks (100 men), at \$84,000; each boat house and dock, at \$55,972.

Over \$12,000.—Each field officer's quarters, at \$15,000.

Over \$9,000.—Each company's officer's quarters, at \$12,000.

HAWAII.

LUKE FIELD.

Over \$20,000.—Four barracks, at \$40,000; 1 post exchange, at \$30,000; 2 seaplane hangars, at \$87,000.

FORT KAMEHAMEHA.

Over \$20,000.—Two barracks, at \$40,000; 1 electrolytic hydrogen plant, at \$130,000.

FORT RUGER.

Over \$20,000.—One barracks, at \$40,000.

PANAMA CANAL.

FRANCE FIELD.

Over \$20,000.—One barracks, at \$70,000; 1 administration building, post exchange, assembly hall, guardhouse and 10-bed infirmary, at \$60,000.

Over \$12,000.—Two field officers' quarters, at \$20,000.

Over \$9,000.—Two double sets captains' quarters for four married officers, at \$22,000.

BALBOA FILL.

Over \$20,000.—Four barracks, at \$70,000; 1 combination administration building, guardhouse, post exchange, at \$71,000; 1 infirmary, at \$31,000; 1 shop, at \$110,000; 1 storehouse, at \$110,000; 1 storehouse, at \$24,000; 2 hangars, at \$110,000.

\$135,000; 1 combination dope, salvage and transportation repair shop, at \$49,000.

Over \$12,000.—Five field officers' quarters, at \$20,000.

Over \$9,000.—Four double sets captains' quarters for eight married officers, at \$22,000.

FORT RANDOLPH.

Over \$20,000.—One barracks, at \$70,000; 2 balloon sheds, at \$50,000.

Over \$9,000.—Two captain's quarters, at \$11,000.

FORT SHERMAN.

Over \$20,000.—One barracks, at \$77,000; 2 balloon sheds, at \$55,000.

Over \$9,000.—Two captains' quarters, at \$12,100.

CORUNDU HILL.

Over \$20,000.—One barracks, at \$70,000; 2 balloon sheds, at \$50,000; 1 helium repurification plant, at \$130,000.

Over \$9,000.—Two captain's quarters, at \$11,000.

HAMMOND TORPEDO.

Mr. SLEMP. On page 95 there is an item for the Board of Ordnance and Fortification and also an item on the Hammond radio proposition.

Gen. COE. I came here on the Hammond radio matter.

Mr. SLEMP. For the radio-dynamic torpedo unit you had \$417,000?

Gen. COE. We have spent very little money under that appropriation. According to the latest statement from the Financial Division, an allotment of \$15,000 has been made for that work, with a balance still remaining on the books of \$13,039.56, so that something like \$2,000 has been spent up to the present time, possibly a little more, as we have not received the latest reports from Boston, where the work is being carried on. We expected before this date to have under contract the construction of the torpedo unit, but the statements made by Mr. Hammond last year and supported by engineers, when we came to put them in the form of a contract with guarantees, could not be carried out. I regard it, as questionable as to whether we would be able for that sum, or perhaps for any sum, to construct a gasoline set of 1,600 horsepower to provide the necessary 35-knot speed which we deem essential for that unit. However, the position we have taken is this, that until we are satisfied that we can get such a unit constructed, we will not place the contract, and we will suspend the work, should we become convinced that it is impracticable.

Mr. SLEMP. General, who is on the board with you handling this matter?

Gen. COE. Col. Abernathy of the Coast Artillery Corps has been designated by the Secretary of War to have charge of the whole matter, and he is handling it as the War Department representative.

Mr. SLEMP. Do I understand that you have not gone very far in the construction of this unit?

Gen. COE. We have not started the construction at all. The small amount of money we have spent has been in preliminary work and investigation.

Mr. SLEMP. Mr. Hammond had a model of his own, did he not?

Gen. COE. It was only a wooden model which was of no real value as a model. Mr. Hammond had complete reports and tests as to

the power necessary for the driving of the model of that shape and size through the water. We found no reason to question those deductions, but the difficulty has arisen in the development of a gasoline-driven engine of the necessary power. While various firms have expressed their entire willingness to undertake such construction, none of them will sign a contract with a guaranty in it, and unless we have that guaranty we may fall away below our standard, as regards speed, and therefore the model will be technically defective and of little value in these experiments.

Mr. BYRNS. You are really at a standstill?

Gen. COE. Yes, sir.

Mr. SLEMP. Do I understand that this contemplates a motor power on the torpedo itself?

Gen. COE. Yes, sir.

Mr. SLEMP. That is what I understood. Did Mr. Hammond contend that he was only to give you a theoretical system from which you were to work out the model?

Gen. COE. No, sir; the original proposal, what is known as proposal "Z" in the original act of 1913 or 1914, included an actual demonstration.

Mr. SLEMP. A demonstration of radio control?

Gen. COE. A radio-controlled torpedo; yes, sir. Now, there is no question as to the radio control of a surface boat. That is a thing which has been demonstrated. We have been carrying on experiments with the Navy also on the radio control of naval torpedos, and they can now be controlled.

Mr. SLEMP. Without any surface antennæ?

Gen. COE. Yes; without any surface antennæ. That is, they can be controlled to a certain depth.

Mr. SLEMP. Did they use Mr. Hammond's system in any way in working out their control to a depth of 6 feet?

Gen. COE. Yes, sir. The question of acceptance is before a special joint Army and Navy board, and unless they recommend the acquisition of Mr. Hammond's rights he can not get the \$750,000 which is carried by the original bill. The joint Army and Navy board will not recommend the acquisition of Mr. Hammond's rights unless it is shown that they are of value to the Government. I speak for the board offhand.

Mr. SLEMP. It would not be of value to the Government unless the torpedo could be controlled at 15 feet under the surface?

Gen. COE. Yes; that is it. Of course, the type of torpedo which we are attempting to design is a coast-defense weapon. It runs under water, and the charge itself will be carried under water at a depth of 15 feet, and it will have an air intake pipe, which is necessary for the gasoline engine.

Mr. SLEMP. And you have not made an engine yet that would give it any particularly wide range?

Gen. COE. Well, it is not a question of range. That would be only a question of the amount of gasoline carried. There is no difficulty about carrying sufficient gasoline to give us the range we need. But it is a question of the speed. A torpedo that has anything projecting above the surface of the water and is traveling at 15 knots, for example, would be vulnerable to a destroyer attack or shell-fire attack to a very much greater extent than the torpedo on which we are

working, which would have a speed of 34 knots. That is, we regard that speed as an essential tactical requirement of such a weapon.

Mr. SLEMP. What are you asking for the future with regard to this?

Gen. COE. We are not asking anything. The Judge Advocate General has rendered an opinion that the funds for this particular item are available for next year, so that no legislation is necessary.

Mr. BYRNS. You still continue your experiments?

Gen. COE. We are not doing much experimenting, but we are continuing our efforts to see if we can get a firm which will enter into a contract with a guaranty for the construction of an engine with the requisite power. Of course, gasoline engines have been going ahead at wonderful rates, and it may be that in the next two or three months we will get a firm that will make a contract. I do not think it is an impossible thing, but it is simply because they are not willing to guarantee it at the present time, and we do not want to expend two or three hundred thousand dollars on the proposition and then come before the committee and say that it was a failure.

Mr. BYRNS. Does that appear to be the only difficulty?

Gen. COE. That is the only difficulty which we think can not be surmounted with reasonable ease at the present time.

Mr. SLEMP. You were to build that unit, and if it proved successful Mr. Hammond was to get \$750,000?

Gen. COE. If it was accepted by the joint board.

Mr. SLEMP. You have not built that unit up to date?

Gen. COE. No, sir; Mr. Hammond is working with us and is doing everything he can to help us out. Of course, it is to his advantage to do so. He is working with us and his engineers are working with us. The expense which we will be put to will be for the employment of engineering talent, but we are limiting that strictly to work which bears directly upon the development of this particular unit and not on any divergent lines.

Mr. SLEMP. You want an engine there that will run the torpedo 15 feet below the surface?

Gen. COE. Yes, sir; at a speed of 34 knots.

Mr. SLEMP. That is the unit you will construct?

Gen. COE. That is what we want to construct.

Mr. SLEMP. But you have found nobody who will agree to do that?

Gen. COE. No, sir.

Mr. SLEMP. Or who will even say that they can do it?

Gen. COE. Various engineers do say that it can be done, and they say they are willing to undertake it; but, they say, "We are not sure how it will turn out, because an engine of that power and of those dimensions has never been constructed, and we will not guarantee it."

Mr. BYRNS. You wish a guaranty?

Gen. COE. Yes, sir; because the more we study it the more uncertain we regard the proposition right at the present time, although it may be solved.

BOARD OF ORDNANCE AND FORTIFICATIONS.

Mr. SLEMP. The item for the Board of Ordnance and Fortifications is withdrawn?

Gen. COE. I do not know anything about that.

MONDAY, MARCH 29, 1920.

**STATEMENT OF HON. JAMES W. OVERSTREET, A REPRESENTATIVE
IN CONGRESS FROM THE STATE OF GEORGIA.****CONSTRUCTION OF SEA WALLS AND EMBANKMENTS, FORTIFICATIONS IN
UNITED STATES—FORT SCREVEN.**

Mr. SLEMP. Mr. Overstreet, do you wish to make a statement in regard to Tybee Island, down at Fort Screven? I think the estimate was for \$526,500.

Mr. OVERSTREET. That is the estimate for the present year.

Mr. SLEMP. The committee will be pleased to hear any statement you desire to make.

Mr. OVERSTREET. Mr. Chairman, I thank you for this opportunity of making a brief statement in regard to this matter. I do not intend to make any extended remarks because you all have the figures that have been submitted by the district engineer, and also comments that have been made by the Board of Engineers here in Washington. You have read those figures, and you have their reports in your possession.

Mr. SLEMP. Yes; they are all in the record.

Mr. OVERSTREET. I only desire to make a statement from the standpoint of a citizen and a Member of Congress from the first district of Georgia, in which is located Savannah, Tybee Island, and Fort Screven. From my boyhood days I have been a frequent visitor to Tybee Island. There is a fine beach that furnishes a fine place for bathers in the summer time. It is considered one of the best beaches on the South Atlantic coast. But there is a treacherous current at times at Tybee Island, and the engineers who investigated it say that the current is in some respects a very peculiar one.

The engineers say that for the last three or four years especially the waters of the Atlantic Ocean have been encroaching upon the island and washing the sand away, and gradually the island is being washed away. I can remember when I was a boy, several years ago, without going back to the exact age, we had a terrific storm there which well-nigh washed the island away. That was at least 35 or 40 years ago, though, and for years the people did not frequent that place as a resort, because they were afraid that other high seas would occur and wash in upon the land and wash away the buildings, as it did on that occasion. As I say, though, the buildings have been rapidly rebuilt, and there are some very elegant residences there now. I believe you visited it?

Mr. SLEMP. Yes; I did. It is perfectly beautiful; a wonderfully attractive place.

Mr. OVERSTREET. It is a beautiful place, and at Fort Screven is the Government reservation. The Government reservation is at the northeastern end of the island.

Mr. SLEMP. Not so very far from the mouth of the Savannah River?

Mr. OVERSTREET. Yes; that reservation is a very beautiful place. When they bought that property many years ago there was no shrubbery there of any kind except some natural growth that was very ugly and unsightly, but that was all taken up by the Government.

and beautiful palm trees were set out all over this Government property. It is really a beautiful place to look at, and it would be a great pity if the elements or the waters were allowed to encroach upon this land and destroy any of this property. Of course, if the property should be preserved by building these jetties or stone walls, as it is proposed by these engineers, it would not only protect the Government property, but it would also protect the property of private citizens who have built there from time to time during the last several years. As I have stated, some people have built some very pretty cottages down there. I have recently received a letter from the mayor of Tybee Island, Mr. Lovell, who writes me that the situation has really become very serious and is growing more so, and he importuned me very urgently in his letter to come before this committee and ask for an appropriation to protect the island from the sea, from being washed away. Of course I have no idea what amount would be required.

Mr. SLEMP. Mr. Overstreet, there has been quite a change in the estimate made by the Engineering Department of the Government that is more or less confusing to this committee.

Mr. OVERSTREET. I understand that, Mr. Chairman.

Mr. SLEMP. Last year, a year ago, when this matter came up, the recommendation of the engineer there was somewhat uncertainly expressed, in a way, and therefore the committee postponed action on it last year. They estimated about \$160,000 for the work at this island a year ago.

Mr. OVERSTREET. Those were the figures recommended for that work last year.

Mr. SLEMP. Those were the figures which you presented to the House in your usual eloquent way, and subsequent to that the local engineer made an investigation of the subject and said it would require double that, or \$320,000. Then a new district engineer appears on the scene and looks over the proposition and says it will take \$527,000 to do the work. There were three distinct reports as to the amount which would be required, which also involves the method by which you stop this erosion, ranging from \$160,000 to \$527,000, all within a space of 12 months, and whether the engineers have made the character of investigation that should be made to determine the best method of providing the protection that you gentlemen want there is a doubtful matter so far as I am personally concerned.

Mr. OVERSTREET. As you know, Mr. Chairman, I am unable to give you any information or to enlighten the committee in any respect on these matters.

Mr. SLEMP. Then I would add that the engineers who have charge of the cleaning out of the Savannah River there and removing the silt and sand, which is done for commercial purposes, to permit a free ingress and egress for vessels, tell me that the removal of that sand for the purposes of commerce takes away the sand that would normally go behind these jetties, the construction of which was originally intended to save that island. So that the fact that they are keeping the mouth of the river open seems to change the engineering problem with regard to the protection of the banks.

Mr. OVERSTREET. Now that may be true.

Mr. SLEMP. It was all so technical that it was difficult for a layman to understand it.

Mr. OVETSTREET. That may be true, and I wish I were an expert engineer so that I could explain the matter to the committee, but I am not an expert engineer and I do not propose to comment on those matters, because I am no expert at all. I only desire to present some facts from the standpoint of a citizen who visited the island and who has seen for himself this work of destruction that is constantly going on and which should be stopped.

I was going to say, too, that last year I had the Chief of the Coast Artillery furnish me with a statement showing the value of the property owned by the Government at Fort Screven, and he gave me with that memorandum the number of buildings, large buildings and small buildings, that were on the island. I have not the exact number at present, but I have the valuation of these buildings on this memorandum which I hold in my hand, and at that time it was \$801,895, besides the land, the armament, and other equipment. I presume that is worth many hundred thousand dollars more. I should not be surprised if the property owned by the Government at Fort Screven is worth to the Government many million dollars in value, and it is constantly enhancing in value. I remember the time when Tybee Island could be bought for a few thousand dollars—for a song. I remember going down there with a friend of mine from Sylvania for the purpose of purchasing a lot. I take my family down there nearly every summer to stay two or three weeks, and we stop at the hotels, which is getting very expensive. I thought of building a cottage down there. My friend and I priced a lot of certain dimensions and the lot seemed to be pretty steep at that price. We thought we would consider it awhile and came home. He died a little while after that and I never bought the place. I went down there several years afterwards and I asked the price of that property and it had gone up 300 per cent or 400 per cent or 500 per cent. Property is enhancing in value and it seems to me it is a pity to let the island remain unprotected.

Now, Mr. Chairman, I desire to say only this in conclusion. I have not offered you any expert testimony, because I could not. As a layman I have given you the benefit of my observation, what I have seen with my own eyes. But all the engineers who have made estimates have said something is necessary to be done. Jetties were constructed there several years ago, but they were small and all except one were washed away, but it is intact. It was made out of large rock and heavy material and it has withstood the tides, the waves, and the storms, and it is there to-day. It seems to me that if that jetty which was built years ago has withstood the tides and storms, other jetties could be constructed similar to that one.

Mr. SLEMP. Now, that was the thought of the local engineer there, and it was upon that thought that he based his estimate of \$320,000. Now, the present district engineer, however, vetoes that idea entirely. He says that you have to go out in the sea and construct a break-water, I forget how many yards long, 48 feet at the base, 15 or 20 feet high, with a surface at the top of about 5 or 6 feet, and that should traverse the jetty and connect near the center, near the land. So that the jetty idea that you have expressed would not work. You would have to haul the lumber from Augusta, Ga., down to

Savannah, and put it on barges, and you could not bring the barges close to the shore, because of insufficient depth of water, and that the total cost of that work would be something over \$500,000. I just give you that as what they said in regard to these jetties. The jetty idea was what I thought we were coming to.

Mr. OVERSTREET. I thought so, too, until this last report.

Mr. SLEMP. Yes; the last report changed it.

Mr. OVERSTREET. Now, gentlemen, as I stated, I can not give you an opinion as an expert on the subject, but I am very anxious for this appropriation to be made, if it can be done. It has been recommended by the engineers and Mr. Slemp has been down there and has inspected the project; he knows something ought to be done. If the committee would recommend a reasonable amount, say \$200,000 or \$250,000, and let the engineers undertake to have the work done, then if more should become necessary to complete the work, the committee could furnish the balance. But I think something should be done and some effort should be made to protect this property that is valuable to the Government and also to the citizens. I think the taxpayers of the island and the people interested in the preservation of the Government property would all like to see it protected.

Mr. OGDEN. You spoke of the value of the fortifications. Have you any idea of what the value of the private property is?

Mr. OVERSTREET. I should think the private property is worth more. Several years ago it was worth very little, but when the Government undertook to improve this property and beautify it, it made the resort very attractive, and for the last several years it has been less frequented by storms than formerly. Years ago we had fearful storms, and high waves would wash away the property on the island. I think, probably, that the property owned by individuals is worth more than the Government-owned property now.

Mr. OGDEN. Are they prepared to do anything toward making the improvement?

Mr. OVERSTREET. I have never heard them discuss that question. I could not answer for the citizens on that point. Where this work is proposed to be done would protect more Government property than private property.

MONDAY, MARCH 29, 1920.

**STATEMENT OF MR. GEORGE McK. McCLELLAN, REPRESENTING
THE CHAMBER OF COMMERCE OF HONOLULU.**

LAND DEFENSES, HAWAIIAN ISLANDS, INCLUDING PROCUREMENT AND
INSTALLATION OF SEARCHLIGHTS, ETC.

CONSTRUCTION OF ROADS.

Mr. SLEMP. You occupy what position?

Mr. McCLELLAN. I represent the Chamber of Commerce of Honolulu. Now, gentlemen, I am not here to try to persuade you that the construction of military roads is a military necessity on the island of Oahu. If the Army does not convince you of that, nothing I

could say would have any weight on that question. All I want to say is something to cover the relationship of the local expenditures to the Federal expenditures on roads on the island of Oahu. You have been made pretty familiar with this map, I judge, which the department has loaned for this hearing. You will see that in these brown lines are existing roads, which have been built by local funds. Those are the only means of communication that the Army has. The local people have spent a great deal of money on roads. Not knowing the exact amount, I cabled out and asked the Honolulu Chamber of Commerce to advise me the amount that has been spent on the island of Oahu in the last 10 years, and they cabled me the answer. The total is \$4,500,000 that has been spent on those roads in the last 10 years. Our schedule of what we expect to spend—while only appropriated for the next two years—is at a rate of expenditure for the future substantially greater than anything that the Army is asking you to spend. I speak of that because the question came up specifically in one of the plans submitted as to whether or not legislation should contemplate some fixed agreement between the local government and the Federal Government on these expenditures. I believe it was finally concluded that that would better be omitted, and I think there is a practical reason for that, because we are going to go on and spend our money, whether you do or not. The only expenditure, as I understand it, that the Army plan calls for on roads that are used for civilian purposes is the strengthening of our bridges and culverts, so that you can haul your artillery and heavy trucks over those roads safely; in other words, an addition purely for military purposes.

Now, what I want to make clear is that the proposed new roads for military purposes are almost exclusively for military purposes, because they are not routes that would be used for commercial purposes. It is not a proposition of getting Federal money to build local roads. As an illustration of that, here is this road coming from Honolulu out to Koko Head.

Mr. SLEMP. What is the character of land and agricultural products produced on the land you have just described from Honolulu to Koko Head?

Mr. McCLELLAN. There is no agricultural production over here at all [indicating]. There is one stock ranch, a dairy, over there, and there is a road sufficient to serve the purpose of the few people who live out there. The construction of the military road over here [indicating] would not be a line that would be used by people in ordinary daily use, if it was constructed. So that it is not something that we are trying to get for the convenience of these people. The area over here [indicating], tributary to Honolulu, is farmed, and this is served by the existing Pali Road; and we are now resurfacing that as a solid concrete road. The roads that we have built on Oahu have been worn out and wrecked more by the Army trucks than by our own use. It has been a very severe tax on our people, because we have had to borrow money to build these roads, and we are approaching the limit of our bonded indebtedness.

Mr. OGDEN. Do you mean to build new roads or rebuild existing roads?

Mr. McCLELLAN. Both to rebuild and to maintain them.

Mr. OGDEN. I can understand that myself, because in my district there are several camps located, and the trucks running over the roads have been very destructive of them.

Mr. McCLELLAN. Here is your military center [indicating]; absolutely the only outlet you have is these county roads. This is what we have always called our belt road, going—well, we call it going around the island, but, as a matter of fact, it goes over the Pali and around to this point [indicating] and back over the middle of the island, down to Pearl Harbor.

Mr. SLEMP. Through the Schofield Barracks?

Mr. McCLELLAN. Yes; through the Schofield Barracks and back down to Pearl Harbor and around to Honolulu. That is the only available military road at the present time of any importance that there is on Oahu. Here is a subordinate road that has been built down here at a considerable expense [indicating]. It was practically destroyed in two years by Army use.

Mr. SLEMP. That is toward Pearl Harbor?

Mr. McCLELLAN. Yes; it goes to Pearl Harbor. Now, so far as the question of expensive roads is concerned, it is true that this road from Schofield Barracks to Kahana Bay would be expensive to build, and so would that road from Schofield Barracks down toward Waialae, but I would suppose from a military standpoint that both would be extremely important. However, the construction from the end of our well-developed road out to Koko Head and across here [indicating], connecting on the windward side with Waimanalo, is a very important one from a military standpoint and less expensive for construction.

Mr. SLEMP. There is no railroad there?

Mr. McCLELLAN. No, sir.

Mr. SLEMP. What is the character of the highway?

Mr. McCLELLAN. There is an indifferently good road down to this point [indicating].

Mr. SLEMP. What distance have you in mind for the total construction you suggest.

Mr. McCLELLAN. I would say that there would be, perhaps, 9 or 10 miles.

Mr. SLEMP. Then would it join up at either end with a macadam road?

Mr. McCLELLAN. Yes, sir.

Mr. SLEMP. And your theory is that it would permit movement of motorized artillery?

Mr. McCLELLAN. Yes, sir.

Mr. SLEMP. Or for transportation of Infantry troops to prevent the landing of troops at a point that could not be easily reached otherwise?

Mr. McCLELLAN. Yes; that is not now available by a quick route.

Mr. SLEMP. Do you know of any towns or villages along that proposed highway?

Mr. McCLELLAN. There are none. The importance of that road is that Waialae Bay is a natural landing place, and presumably one of the points where an effort would be made to land troops. In a certain

way Waiamanalo Bay, on the other side, is also a valuable place for landing troops.

Mr. SLEMP (interposing). You said that the people of Oahu were going on with their highway development whether anything was done on this line or not. Now, what is the proposed highway development of the island?

Mr. McCLELLAN. It is, to a very large extent, rebuilding the roads which the Army has destroyed.

Mr. SLEMP. What new roads have they in mind to construct?

Mr. McCLELLAN. Practically none.

Mr. FRENCH. Is there any cooperative road work done there in which the Government bears a part of the cost?

Mr. McCLELLAN. The Government has not spent a dollar, Mr. French.

Mr. SLEMP. That is, it does not participate in the road fund that the States of the Union have?

Mr. McCLELLAN. The Federal Government does not even participate in the maintenance of roads already built. They not only do not contribute to the building of roads, but they do not contribute a dollar toward the maintenance of the roads that we have built. Hawaii is wholly excluded from the benefits of the good-roads act.

Mr. SLEMP. You have a very good system of highways developed there now to meet your needs?

Mr. McCLELLAN. We have a system that pretty well meets our commercial needs if we could maintain them.

Mr. SLEMP. What would be the cost of restoration of your entire road system?

Mr. McCLELLAN. If the Territory can sell its bonds, it is going to spend about a million and a half dollars this fiscal year.

Mr. EAGAN. And for several years?

Mr. McCLELLAN. I presume we will keep them up as long as our borrowing capacity lasts.

Mr. EAGAN. At about the same rate?

Mr. McCLELLAN. Yes; at about the same rate.

Mr. SLEMP. Is there any increase in the rate of population in the island of Oahu?

Mr. McCLELLAN. There has been some, but not very great. Conditions have changed since you were there. There is some little development in these little sections [indicating], but that is going to be increased by the improvement of our county roads, and it will make some development on what we call the windward side of the island.

Mr. OGDEN. Are all your roads used extensively by Government trucks?

Mr. McCLELLAN. No, sir; not all the roads. The roads used by Government trucks are principally, beginning at Honolulu, reaching out around Diamond Head; from Honolulu out to Pearl Harbor and then on up to Scofield Barracks, and from there more or less down to Waialua; but the principal traffic is from Honolulu to Scofield Barracks.

Mr. SLEMP. Have you a good road along the coast around Kopai Bay?

Mr. McCLELLAN. Not very good.

Mr. SLEMP. What is the character of construction?

Mr. McCLELLAN. That is rather superficial.

Mr. SLEMP. Is it a macadam road?

Mr. McCLELLAN. No, sir; I think it has been surfaced along there in part with coral, which serves very well for ordinary traffic.

Mr. SLEMP. Is that a disconnected piece of road?

Mr. McCLELLAN. It is, more or less.

Mr. SLEMP. What is its connection with Honolulu and other centers?

Mr. McCLELLAN. It is not thoroughly connected with Honolulu. The people out here never drive to Honolulu. They get on the train.

Mr. SLEMP. There is train service?

Mr. McCLELLAN. Yes, sir; a train runs along here [indicating] and they can go by railroad much cheaper than by driving.

As to the advisability and sound policy of having the Government build military roads in Oahu, that is partly a question of probabilities. In the event of war with a power which we are most likely to have trouble with, if an enemy were able to make a landing on the island of Oahu and get a foothold, it would cost this Government a quarter of a billion dollars to dislodge them. Now, while we are not anticipating any immediate war in that direction, still, so far as the method of defense is concerned, there is no money that the Government can spend that will actually go as far toward making for the safe defense of the island of Oahu as a system of military roads, built on tactical routes and not for commercial purposes; and it has seemed to us that there is no form of war insurance that can be put upon the island of Oahu that will mean as much as these roads to give mobility to the forces maintained there.

Presumably any landing would be attempted at three or four points at once, or they might be obliged, because of the condition of the weather when they arrived, to change their plans from the windward side and swing around to the Waialua side or to the Waianae side. They would be obliged to shape their plans according to the condition of the weather when they arrived. All of these conditions make it of first importance that quick and complete mobility of the Oahu garrison be made possible in advance of the crisis. Now, with your airplanes to watch every movement of the hostile troops, with your roads to throw your own forces down to the place where the landing would be attempted, with your machine guns and other methods of defense, you would have a tremendous decrease in the probability of a successful landing.

Mr. SLEMP. Will you trace the railroad for us around the island? The railroad starts at Honolulu?

Mr. McCLELLAN. The railroad begins at Honolulu, runs out through Moanalua through Aiea, past Pearl City, past Waipahu.

Mr. SLEMP. You are leaving the coast now? You are away from the coast?

Mr. McCLELLAN. It is along the margin of Pearl Harbor.

Mr. SLEMP. That is what I want to know. Keep that idea in mind as you go along.

Mr. McCLELLAN. It goes past Waipahu, then cutting inland past Ewa Mill, then reaching the coast again at Browns Camp, following the coast, then past Pokai Bay, opposite Waianae.

Mr. SLEMP. Continuing along the coast?

Mr. McCLELLAN. Continuing along the coast to Kaena Point, where it turns abruptly eastward, still along the coast, through Mokuleia, running inland some 2 miles, then coming back to the beach at Haleiwa, on Waialua Bay, then following the beach through Waimea, northeast to Kahuku.

Mr. FRENCH. That is the extreme northern point of the island?

Mr. McCLELLAN. Yes; and then running southeast to Kahuku Mill. It stops at that point.

Mr. FRENCH. Is there any railroad service on the southern side of Honolulu?

Mr. McCLELLAN. None whatever.

Mr. FRENCH. And none to the east.

Mr. SLEMP. What is the type of this railroad? Is it a narrow-gauge railroad?

Mr. McCLELLAN. Yes. It is a narrow-gauge road, very well operated, with a very good roadbed.

Mr. OGDEN. What is the length of the railroad?

Mr. McCLELLAN. About 72 miles. It also extends up this gulch to Scofield Barracks.

Mr. SLEMP. Now, it would be possible, desiring to transport troops along the Pokai Bay coast, to transport troops by rail from Scofield Barracks?

Mr. McCLELLAN. If you had sufficient equipment?

Mr. SLEMP. Yes.

Mr. McCLELLAN. But there is not sufficient equipment there to move a number of troops, the particular number of troops that you plan to keep there.

Mr. SLEMP. Could you move 10,000 troops with the equipment you now have in a short time?

Mr. McCLELLAN. You could move 10,000 troops in a day. Of course, the idea of this road is that they could march down in an hour.

Mr. SLEMP. But the idea of the military road from Scofield Barracks to Pokai Bay is to provide for troops being delivered there within an hour; is that it?

Mr. McCLELLAN. Yes; and absolutely protected, whereas an attempt to move them by train would not be protected, because it would be a sure mark for an enemy if he had established himself within shelling range. They would be subject to fire from this point clear to their destination. Mr. Chairman, from Honolulu over to the southeastern part of the island there is no railroad whatever, and I think the consensus of the local opinion has always been that that section of military road would be very important.

Mr. SLEMP. That is a very difficult road to construct along there, is it not?

Mr. McCLELLAN. No, sir; there are no difficulties whatever up to this point [indicating]. There you would have some difficult construction, just along there for a short distance [indicating], I would say a mile and a half.

Mr. SLEMP. You do not know what it would cost there?

Mr. McCLELLAN. I would say that section right there would cost between \$50,000 and \$60,000 a mile.

Mr. EAGAN. How many miles?

Mr. McCLELLAN. I should say at a guess about a mile and a half, but the other would be comparatively ordinary road building. We already have a road along here [indicating], but it is not a military road. It is serving the purpose of people who live there, but it has not the qualities of a military road.

Mr. SLEMP. You would also deliver troops by rail from Scofield Barracks to Pahanā Bay?

Mr. McCLELLAN. Yes; but the quickest way of doing that would be to have the men march down to here [indicating] and board a train here [indicating].

Mr. SLEMP. They would march down to station No. 380?

Mr. McCLELLAN. Yes, sir.

Mr. SLEMP. How far is it down to station No. 380?

Mr. McCLELLAN. About 8 miles. I would say. There is no railroad there.

Mr. SLEMP. Is it a good automobile road down there?

Mr. McCLELLAN. Yes; there is a good automobile road down there. You could march your troops down there and entrain them there much more quickly than you could take them around here by rail [indicating].

Mr. SLEMP. There is no rail route in that direction?

Mr. McCLELLAN. No, sir.

Mr. EAGAN. Is there any agricultural development from Scofield barracks out here?

Mr. McCLELLAN. Yes; right in here is a pineapple section [indicating].

Mr. OGDEN. And to that extent the road would benefit the pineapple industry?

Mr. McCLELLAN. Well, they already have their country roads, their dirt roads, but their route is not along that way; their route is along here [indicating]. They have their roads connecting with the main line to come to the city. As a matter of fact, their pineapples move by train to Honolulu.

Mr. SLEMP. What do you think would be the cost of the road from station 385 down to station 171, or have you any figures on that?

Mr. McCLELLAN. I have no figures on that. I want to make clear that our local government is spending large sums on its own roads and that this is a military proposition to build additional roads for strictly defense purposes; and that it is not an effort on our part to get additional country roads built for local commercial use.

Estimates of appropriations for "Barracks and quarters, seacoast defenses, Philippine Islands and Hawaii."

Fort Mills, P. I.:

Salt-water system for fire protection, sewer and toilet flushing	\$100,600
Concrete lorchā dock	90,000
Electric hoist cableway	15,000
Reinforced concrete water tank for central power plant ..	1,500
4 sets of family quarters for ordnance machinists	23,000
	<hr/> \$230,100

Fort DeRussy, H. T.:

Mechanics' shop, 20 by 60 feet-----	\$1, 500	
Quartermaster storeroom and office building, 140 by 30 feet-----	8, 000	
Corral for 30 animals, 125 by 125 feet-----	1, 000	
800 linear feet macadam roads, including curbs and gutters-----		1, 650
1,550 linear feet sidewalks, at 75 cents-----		
1,550 linear feet sewers, at \$2-----		
1,550 linear feet water lines, at \$1-----		
1,550 linear feet electric-light conduit, at \$1.50-----		
3,000 cubic yards fill, at \$1-----		
1,400 linear feet main road to be macadamized-----		
		12, 150

(The roads, sidewalks, sewers, etc., is in connection with the construction of the above buildings.)

Fort Kamahameha, H. T.:

2 barracks, 160 by 141 feet, frame-----	50, 000	
Garage, 104 by 20 feet, frame-----	2, 800	
Road construction, macadam-----	30, 000	
2,000 linear feet sewers, at \$2-----	4, 000	
800 linear feet water, at \$1-----	800	
900 linear feet lights, at \$1-----	900	
1 sewer pump and pump house-----	3, 000	
		91, 500

(The construction of road, sewers, water, etc., is in connection with the construction of the above buildings.)

Fort Ruger, H. T.:

Corral for 30 animals, 125 by 125 feet-----	1, 000	
Store room for paints, oils, etc., 20 by 20 feet-----	1, 200	
Addition to Quartermaster storeroom, 30 by 50 feet, with basement-----	4, 000	
Fire station-----	3, 000	
Roads, walks, sewers, and water connections for the above proposed new construction; electric light extensions for the above buildings-----	2, 350	
		11, 550
Grand total-----		345, 300

BARRACKS AND QUARTERS, PANAMA.

Fort Amador:

Engine house, concrete-----	\$7, 000
Garage, frame-----	2, 000
Pipes for surface drainage-----	3, 500
Extension and addition to ordnance repair shop-----	14, 000
	26, 500

Fort Randolph:

Construction of roads-----	19, 500
Shop buildings for ordnance machine shop, ordnance storehouse, artillery engineer electrical shop and store room-----	35, 000
	81, 000

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FORTIFICATIONS APPROPRIATION BILL FISCAL YEAR 1922

HEARINGS

BEFORE THE

SUBCOMMITTEE OF HOUSE COMMITTEE ON APPROPRIATIONS

CONSISTING OF

**MESSRS. C. BASCOM SLEMP (CHAIRMAN), DANIEL R. ANTHONY, JR.,
BURTON L. FRENCH, JOHN J. EAGAN,
AND S. HUBERT DENT, JR.,**

IN CHARGE OF

THE FORTIFICATIONS APPROPRIATION BILL

SIXTY-SIXTH CONGRESS

THIRD SESSION



**WASHINGTON
GOVERNMENT PRINTING OFFICE**

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COMMITTEE ON APPROPRIATIONS.

HOUSE OF REPRESENTATIVES.

SIXTH-SIXTH CONGRESS, THIRD SESSION.

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FORTIFICATIONS APPROPRIATION BILL, FISCAL YEAR 1922.

HEARINGS CONDUCTED BY THE SUBCOMMITTEE, MESSRS. C. BASCOM SLEMP (CHAIRMAN), DANIEL R. ANTHONY, JR., BURTON L. FRENCH, JOHN J. EAGAN, AND S. HUBERT DENT, JR., OF THE COMMITTEE ON APPROPRIATIONS, HOUSE OF REPRESENTATIVES, IN CHARGE OF THE FORTIFICATIONS APPROPRIATION BILL, ON THE DAYS FOLLOWING, NAMELY:

MONDAY, JANUARY 31, 1921.

STATEMENTS OF MAJ. GEN. LANSING H. BEACH, CHIEF OF ENGINEERS, MAJ. GEN. FRANK W. COE, CHIEF OF COAST ARTILLERY, MAJ. C. GARLINGTON, AND MAJ. GEORGE RUHLEN, Jr.

GENERAL STATEMENT OF MAJ. GEN. L. H. BEACH, CHIEF OF ENGINEERS, AND MAJ. GEN. F. W. COE, CHIEF OF COAST ARTILLERY.

Mr. SLEMP. Gen. Beach, we are taking up the fortifications estimates. You are the present Chief of Engineers?

Gen. BEACH. Yes, sir.

Mr. SLEMP. General, do you desire to make a general statement with regard to the engineering situation with reference to fortifications?

Gen. BEACH. Just a short general statement with regard to our estimates and the general situation.

Mr. SLEMP. You may proceed, General.

Gen. BEACH. We have kept our estimates as low as we felt was possible, consistent with the national safety and proper defense. It is, of course, realized that it takes considerable time to build the larger caliber guns and quite a considerable time to acquire the land and actually complete the fortifications. We feel that certain measures which we have requested in these estimates are absolutely essential for the proper safeguarding of our coast and outlying possessions. The committee, of course, realize that at the present time action with regard to hostilities often comes very suddenly and sometimes precedes a declaration of war.

You will remember that the Japanese fleet attacked the Russian fleet at the outbreak of the war between Russia and Japan before there was any declaration of war whatever, and that the Russian fleet was caught entirely unprepared. There is reason to believe that our outlying possessions on the Pacific, and especially Panama, would be attacked in case of hostilities before there was any declaration of war, and we feel that those localities should be provided with certain guns and such fortifications that they can be made safe against any sudden or unexpected attack. The estimates are very largely for

the construction and installation of 16-inch guns, which are the largest——

Mr. SLEMP (interposing). The Engineers have nothing to do with the construction of the guns?

Gen. BEACH. No, sir.

Mr. SLEMP. Just the emplacements?

Gen. BEACH. The emplacements. I said "construction," but I meant for the emplacements for the 16-inch guns which are to be provided, because it is of the utmost importance that our batteries should be armed with guns which can reach the enemy's fleet standing offshore and not allow that fleet to bombard our fortifications or seaports beyond the range of any gun which we may have available for attacking them. I have to speak, of course, of the range of the guns, because that is the feature that comes in, although it is only the installation which properly belongs to us and not the construction of the guns.

Mr. SLEMP. General, what part of your estimates this year, as far as engineering is concerned, relates to maintenance and what part to construction?

Gen. BEACH. That is all set forth in the estimates.

Mr. SLEMP. You are not asking for a great deal of money for construction, are you?

Gen. BEACH. We are asking for only what we regard as absolutely necessary. You will find that that is all itemized in the estimates. For the construction of guns and mortar batteries, we are asking \$742,482.

Mr. SLEMP. Is that the only construction item you have?

Gen. BEACH. And an item for modernizing older emplacements, so as to make them correspond.

Mr. SLEMP. Will you please have some one in your office put into the record the amount of money in the engineering estimates separated as to new construction, as to old construction; that is, continuing, and as to maintenance?

Classification of engineer estimates.

	Original estimate.	Revised estimate.
New construction.....	\$1,457,488	\$793,375
Old or continuing construction.....	1,051,203	672,905
Maintenance.....	886,800	816,856
Total.....	3,395,491	2,193,139

Gen. BEACH. That can be given you in just a few moments.

Mr. SLEMP. The sum total under those heads?

Gen. BEACH. Yes, sir. I wish merely to invite attention to the fact that the acquiring of land and the construction of emplacements requires considerable time, and we felt that what we have submitted estimates for at the present time should be commenced now and be carried forward as rapidly as possible if our coast and our outlying possessions are to be placed in a proper condition of defense.

FORTIFICATIONS POLICY.

Mr. SLEMP. What plan are you working under?

Gen. BEACH. The one approved by the War Department, all the different branches of the service connected with coast defense working together; that is what you mean?

Mr. SLEMP. The Board of Review projects?

Gen. BEACH. Yes, sir; that general plan. This confidential statement is a memorandum for the Chief of Staff.

Mr. SLEMP. Yes, but you are working under what is known in the Army as the Board of Review project. That is right, is it not?

Maj. GARLINGTON. In this sense only, the functions of the Board of Review have now been taken over by the War Plans Division and we are working with the War Plans Division at the present time.

Mr. SLEMP. I do not understand that anything in this estimate is not included in what is known as the Board of Review project, afterwards adopted by the War Plans Division?

Maj. GARLINGTON. Adopted in part. This is all within it.

Gen. BEACH. We have omitted what we thought could be omitted without danger to the national defense.

Mr. SLEMP. The items represented by the estimates in this bill, when completed, will represent the full consummation of the Board of Review's project as the War Department desires to have it done?

Gen. BEACH. Oh, no; we are only asking for such portion as should be done without delay.

Mr. SLEMP. Are you going to reserve for the future your decision as to whether or not you will finally complete the Board of Review project?

Gen. BEACH. We know that we are going along further than we are asking money for now and that there will be other items to complete this. Whether the plan is carried out in its utmost detail will depend very largely on future considerations.

12-INCH GUN EMPLACEMENTS.

Mr. SLEMP. Have you emplaced all the 12-inch guns provided for by Congress?

Gen. BEACH. We are not asking for any funds for 12-inch gun emplacements at the present time, except to complete those at Hog Island and Nahant, Boston.

Mr. SLEMP. All the rest have been emplaced?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. The guns have been put upon their cradles or carriages?

Maj. GARLINGTON. That will all be done by June 30, 1921.

Mr. SLEMP. Do you make any request for money for guns of smaller caliber than the 12-inch?

Maj. GARLINGTON. Not in these estimates.

16-INCH GUN AND HOWITZER EMPLACEMENTS.

Mr. SLEMP. What do these items carry for guns of higher caliber than the 12-inch type?

Maj. GARLINGTON. \$600,000 for the emplacement of 16-inch guns at certain localities.

Mr. SLEMP. You desire provision made for certain 16-inch guns?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. Do you make any request for money for 16-inch howitzers?

Maj. GARLINGTON. Yes, sir. When I said "guns" I meant in the general sense, guns and howitzers.

14-INCH GUN EMPLACEMENTS.

Mr. SLEMP. Do you find any place in your defensive scheme for 14-inch guns?

Gen. BEACH. Yes, sir. There are some to be mounted on emplacements, and the Coast Artillery hopes to use a number of them in the railway service.

Mr. SLEMP. Are you preparing any emplacements for the 14-inch guns?

Gen. BEACH. None at the present time.

Mr. SLEMP. In order to make the 14-inch guns available, it will be necessary to spend a large amount of money in the future to provide emplacements for them. But I understand you are not going to emplace them; that the only way in which you would use them would be on railway mounts?

Gen. BEACH. We are making no estimate.

Mr. SLEMP. Do you regard the 14-inch guns which you have as having taken the place of any portion of the board of review project?

Gen. BEACH. The use of the 14-inch gun on railway mounts is something which is being studied and being developed as rapidly as possible. I think there has not been any definite decision as yet as to the final disposition of all of them.

Mr. SLEMP. You are asking for a lot of money on account of them?

Gen. BEACH. Not the Engineers.

Mr. SLEMP. Well, the Army is asking for the completion of forty-two 14-inch guns, and when completed they will be used for what purpose?

Gen. BEACH. They will be used on railway mounts.

Mr. SLEMP. To take the place of what?

Gen. BEACH. To take the place of the smaller caliber, the 12-inch gun, and to a certain extent the 14-inch gun in fixed emplacements.

Mr. SLEMP. You regard the 12-inch gun as obsolete now, practically, do you?

Gen. BEACH. Except in certain localities. There are some certain localities where they can be used to protect mine fields and also to keep the enemy's fleet away from the coast at certain harbors but, for the more important harbors, the larger roadsteads, the 14-inch and 16-inch guns are necessary.

MILITARY VALUE OF 14-INCH GUN.

Mr. SLEMP. Do you not really think that the Army is getting to the point of not wanting any guns at all, except 16-inch guns for defensive purposes, and that they regard the 16-inch howitzers and the 14-inch guns of about the same value—only useful for some subordinate purpose?

Gen. BEACH. No, sir. My opinion would be that that is not so. The 16-inch gun is very expensive to build and it is very expensive

in operation, and there are a great many localities where a gun of less power, less range, and correspondingly less expensive would answer the purpose for which they would be used.

Mr. SLEMP. You make that general statement, although you have not studied out any particular locality where you would recommend the 14-inch gun on a railway mount in preference to the other?

Gen. BEACH. That matter of the use of the 14-inch gun on railway mounts is what might be termed still a liquid question and has not been solidified, and it is a question which is now being studied by the Coast Artillery and ourselves.

Mr. SLEMP. My general information has been that the 14-inch gun on a railway mount is supposed to take the place of certain guns originally provided for in the board of review project. Is not that right?

Gen. COE. Yes, sir; as supplemental.

Gen. BEACH. The question has come up with regard to the use of the 14-inch guns and the manner in which they would be most efficient, and it has been a question whether they should all be on railway mounts or whether some of them should be put in fixed emplacements. That question is still under discussion and has not been definitely decided. It is my impression that some of them in this report of the board of review were expected to be in fixed emplacements. The Chief of Artillery thinks that the guns could be practically all used on railway mounts. The Engineer Department has taken the position that that may be correct, but before a definite decision is made there should be more information on the subject than we possess at the present time.

Mr. SLEMP. If you are going to ask for money to complete the construction of a large number of 14-inch guns you ought to be able to state to Congress just what use you will make of those guns when you get them, whether their use is justified by the studies of the War Department, and to state where the guns are going to be placed, under what circumstances, and in what relation they stand to the national defense.

Gen. BEACH. There is not any question about the use of the gun and their value to the coast defenses. The only question is of getting the greatest efficiency from these particular guns. We may get the greatest efficiency along the line that Gen. Coe is advocating, but it is a step in advance of anything that has been done before, and the question is whether they should all go on railway mounts or whether a part of them should go on railway mounts, and, if so, how large a proportion; and whether the rest should go into fixed emplacements, and, if so, what proportion.

Mr. SLEMP. The department is not ready to make any recommendation to Congress on that point?

Gen. BEACH. That is my understanding.

Gen. COE. Exactly.

GENERAL CONDITION OF COAST DEFENSES.

Mr. SLEMP. What is the general condition of our defenses, taking them as a whole? Are they in better condition than they ever have been?

Gen. BEACH. No, sir; relatively, I would say no, because the construction and development of armament on board of vessels has brought 14 and 16 inch guns into use while our fortifications were practically designed with the 12-inch gun as being the heaviest armament that was likely to be used. The recent developments in ordnance have placed our fortifications behind in the scale of efficiency.

Mr. SLEMP. Of course, General, you knew and the Coast Defense people knew when they were completing the 12-inch gun emplacements that obsolete emplacements were being completed.

Gen. BEACH. I would not like to be recorded as admitting that.

Mr. SLEMP. The chronology proves it. However, that is past. I hope you will not do it in the future. Are you spending or proposing to spend any money on the 14-inch guns which, under present conditions, bear the same relationship to advances in long-range firing and improved or thicker armor as the 12-inch guns did?

Gen. BEACH. No, sir; I would not admit that because, as I stated, there are a great many places where a 12-inch gun can be used and used very effectively, and there are a great many targets at which a gun of that size would be effective. I think that all the fortifications ought to be provided with the proper caliber guns.

Mr. SLEMP. Gen. Coe, you made a statement during the hearings last year covering that general proposition. Do you adhere to the conclusion expressed then?

EFFECTIVENESS OF 12-INCH GUNS.

Gen. COE. Yes, sir. The answer I would make to your question is this, Mr. Slemp, that when we installed those 12-inch guns on long-range carriages, which we did in 1915 and 1916, it was well known at that time that the 12-inch gun was not the most powerful gun and probably not sufficiently powerful to attack the most modern battleship. However, in putting those guns on those carriages the Board of Review used them in such a way that they could attack the decks of vessels and, at that time, the 12-inch gun could successfully attack the deck of any vessel afloat, also the 12-inch gun can probably attack the deck of any vessels afloat to-day, with possibly one or two exceptions. It is not powerful enough to attack the deck of a modern battleship and by "modern" I mean ships that have been launched within the last six or eight years.

Mr. SLEMP. What thickness of deck armor could they penetrate?

Gen. COE. Probably 5 to 6 inches.

Mr. SLEMP. Are there many vessels constructed now that have that strength of armor?

Gen. COE. As far as I know, from official reports received, there is only one vessel, the *Hood*, which has a greater protection than that.

Mr. SLEMP. The *Hood* was built some time ago, but you gentlemen continued the expenditure of large amounts of money even up to the fiscal year 1921 on the 12-inch gun proposition?

Gen. COE. Very little, Mr. Slemp.

Mr. SLEMP. We carried an appropriation on account of them last year and the year before—you simply got up against the proposition of whether you should go on or not?

Gen. COE. It was a question of economy.

Mr. SLEMP. Whether you should go on or not?

Gen. COE. Yes, sir.

Mr. SLEMP. Are you not making the same mistake on the 14-inch gun proposition that you did with respect to the 12-inch guns?

Gen. COE. It is impossible for anyone to predict.

Gen. BEACH. There is one point I would like to make in that connection, and that is this: You will notice that the weight of the projectile for the 12-inch gun is 1,070 pounds, and its range is 9.8 miles. The weight of the projectile of the 14-inch gun is 1,660 pounds, and its range is 23.6 miles, while in the case of the 16-inch gun the weight of the projectile is 2,400 pounds and its range is 25.5 miles. Now, there are cases where you want to cover the waters closer in than the distant range of the 16-inch gun, and that could be done with a smaller caliber than the largest, and it seems to me that it is economy to use the 12-inch guns for the interior defense and the smaller vessels than to rely entirely upon the largest calibers that you can build.

Mr. SLEMP. Of course, your general proposition when you installed the 12-inch guns was that they were the very maximum—the major armaments for your defenses.

Gen. BEACH. At that time; yes.

Mr. SLEMP. The point that I am making is that when you found that they were obsolescent, you still continued the construction of them. In just the same way you are going on with your 14-inch project, knowing at the same time that the 16-inch gun is very much better for the purpose. Then, as soon as you get them in place, you will say that they are obsolescent, and that the 16-inch gun is what you want.

Gen. BEACH. Another feature of the case is that as the number of guns afloat multiply we must increase our guns correspondingly, and the number of 12-inch guns that were allowed and that we installed is by no means excessive. I think they are only the number that might be considered actually necessary.

Mr. SLEMP. Let us see about that. We have spent on this fortification proposition since 1915 more money than we had spent on fortifications prior thereto since the beginning of this Government. That has gone on for four years, and now you tell us that we are in a worse condition than we ever were before. That is a difficult statement to sustain unless you criticize the expenditure of the money.

Gen. BEACH. All of those fortifications are not yet completed.

Mr. SLEMP. Then, we have wasted a lot of money in the last four years, because we have spent more money in the last four years on fortifications than we had spent before in the history of the country.

Gen. BEACH. But everything has cost more, and you have to have so much more.

TARGET PRACTICE RESULTS.

Mr. SLEMP. Let us get at it on another line: I would like for you to put in the record a statement showing your percentage of hits. There have been some conflicting statements about that.

Gen. BEACH. We would have to get that from the Coast Artillery. Gen. Coe would be the one to furnish that information.

Mr. SLEMP. One of the officers of the Air Service stated to this committee a few days ago that the percentage of hits by the long-

range guns—the 14-inch and 16-inch guns—was only about 1 per cent, and that the Air Service could give 11 per cent protection, or 11 per cent of hits. He further stated that the explosive charge that the 16-inch gun carried was only 50 pounds, and that they could carry 1,000 pounds; and that, after all, the defense proposition that we are appropriating money for was for that reason obsolescent and useless. What have you to say as to that statement?

Gen. BEACH. I would want to look that matter up.

Mr. SLEMP. Is it a fact, that within the ranges you have mentioned here, your percentage of hits is only 1 per cent?

Gen. BEACH. Just what the exact percentage is, I would not like to state offhand. I will state this, that as far back as the Civil War the number of rounds or amount of lead fired was 13 times the weight of a man for every man that was hit, and I do not think that that ratio has been very greatly diminished in recent warfare.

Mr. SLEMP. That does not answer the question as to what your experiments show.

Gen. BEACH. I only wanted to bring that out to show that the percentage of hits is always small in actual warfare.

Mr. SLEMP. Is it as small as 1 per cent?

Gen. BEACH. I do not know. I would not like to say. I would have to look that up.

Gen. COE. We have never had as small a percentage of hits as that in any series of firings we have had. I would be glad to discuss that point more at length when I come before the committee.

Mr. ANTHONY. What is the longest range at which you ever fire your old coast defense guns?

Gen. COE. We very frequently fire them at their maximum range, whatever that may be. In the test that we had recently at Pensacola, firing at the obsolete battleship *Massachusetts*, we fired 12-inch guns at a range of 20,000 yards. We fired one series of 20 rounds and in that we secured two actual hits.

Mr. ANTHONY. Is that the longest range at which you have ever fired at a target?

12-INCH GUN RANGES.

Gen. COE. No, sir; we have fired at targets at longer ranges than that with 12-inch guns.

Mr. ANTHONY. How much longer?

Gen. COE. Probably 25,000 or 26,000 yards. The maximum range of any 12-inch gun we have installed is 27,000 yards.

Mr. ANTHONY. Is that the maximum range for any of those guns installed?

Gen. COE. Yes, sir; for the 12-inch guns.

Mr. ANTHONY. What is the maximum range of the 12-inch gun when fired from a battleship?

Gen. COE. From the modern mounts of battleships, probably 30,000 yards. That is true because the 12-inch gun mounted on the modern battleship is much more powerful as it has a much greater muzzle velocity than ours.

Mr. ANTHONY. We were told a few years ago that the range of a 12-inch gun when fired from a battleship was much less than the range when fired from shore.

Gen. COE. That was very true at that time. That was a correct statement, but the method of mounting guns on battleships has been changed a great deal within the last three years.

Mr. ANTHONY. Do you mean to say that you can mount them more efficiently on a battleship than on shore?

Gen. COE. No, sir; but they mount them on battleships now in such a way that they can get practically the maximum range with them.

Mr. ANTHONY. But they can not fire them further than you can from the shore?

Gen. COE. Not with the same gun. I said they could be fired at a range of 30,000 yards. That difference is because of the fact that our guns are old, and we have no 12-inch guns greater than 40 calibers.

Mr. ANTHONY. How about the relative maximum ranges of 16-inch gun fired from the deck of a battleship and from shore?

Gen. COE. A 16-inch gun of the same power would probably have a slight advantage from a shore mount. The deck support which would have to be provided for a 16-inch gun on a battleship would involve a very serious question in order to get a 45 degree elevation.

Mr. ANTHONY. We were told two years ago that when you elevated the 9-inch gun sufficiently to get the ranges that you have been talking about it would be liable to endanger the whole deck structure of the battleship.

Gen. COE. That was true; but they have strengthened the decks of battleships.

Mr. ANTHONY. As a matter of fact, has not modern warfare demonstrated that any captain who would bring a battleship within the effective range of a 12-inch gun or 16-inch gun mounted on shore would be liable to be tried by court-martial?

Gen. COE. They did it continually at the Dardanelles and along the Belgian coast.

Mr. ANTHONY. They always got the worst of it, did they not? That was the case at the Dardanelles, was it not?

Gen. COE. I do not think that battleships were at such a great disadvantage in the Dardanelles with regard to guns as they were with regard to mines. It was the mines that gave them their great trouble.

Mr. ANTHONY. Was not a battleship sunk in the Dardanelles by direct gunfire?

Gen. COE. They had one battleship sunk by direct artillery fire at the Dardanelles, but what prevented success there was the floating mines.

Mr. SLEMP. It was stated in the hearings last year that the purpose of your large guns was to keep hostile naval vessels at a distance, so that they could not fire upon centers of population or upon Government facilities at naval bases, etc.

Gen. COE. Yes, sir; that was very true.

Mr. SLEMP. And that is really the general purpose of these large guns?

Gen. COE. Yes, sir.

Mr. SLEMP. You put them down on the coast generally at some little distance from the protected centers, and at points farther seaward than such centers of population, and to that extent your guns would have an advantage in the matter of location?

Gen. COE. Yes, sir.

Mr. SLEMP. But I do not understand that the range on account of the elevation secured on the battleship would be as large as that secured from a similar gun mounted on shore.

Gen. COE. I think it would surely be as great, except with the most powerful gun. When you take the 16-inch gun, which is the largest naval gun used, it will be almost impossible so to strengthen the deck as to enable you to fire a 16-inch gun from it at an angle of 45 degrees. A 16-inch gun mounted on the latest Japanese battleship, according to my understanding has a range of 40,000 yards.

Mr. SLEMP. Japan is the only nation in the world that has 16-inch guns on a battleship?

Gen. COE. Yes, sir.

Mr. SLEMP. The *Hood* has none?

Gen. COE. It has 15-inch guns.

Mr. SLEMP. And the 16-inch gun, of course, would keep the 15-inch gun some distance farther out?

Gen. COE. Not necessarily; they might make the same range with the 15-inch gun as with the 16-inch gun.

CHARACTER OF EMPLACEMENT.

Mr. SLEMP. I wish to ask another question about the character of the emplacements that you are contemplating under these estimates.

Gen. BEACH. They are barbette open fire.

Mr. SLEMP. I understood that that would be the type of the mount, but that the emplacements would be different.

Gen. BEACH. Do you mean the character of the material?

Mr. SLEMP. What kind of emplacements are you figuring on for this coming fiscal year? Last year the Chief of Engineers stated that they would not spend any money appropriated for this present fiscal year until they studied the matter and determined the kind of emplacement or type of emplacement that they felt they ought to have. What kind of emplacements are you figuring on for this coming year?

Maj. GARLINGTON. At only one place do we contemplate putting in the old completely protected structures, and that is on a small island in Boston Harbor. At the other localities, for which we are asking money for next year, we expect to put in only the blocks from which the guns will be fired, and build dispersed structures among the sand dunes for the storage of ammunition.

Mr. SLEMP. Have you figured out the difference in the cost of those two types of emplacements?

Maj. GARLINGTON. Yes, sir; as near as we could from the data at hand, and we have estimated a saving of about 50 per cent.

Mr. SLEMP. What board made the study on which you based your conclusion?

Maj. GARLINGTON. The plans were studied by the Engineers and the Chief of Coast Artillery for each locality, and each separate study was transmitted to the War Plans Division for action as a separate problem. Our studies of the general question convinced us that you have to treat each place differently, bearing in mind the differences in topography, terrain, etc.

Mr. SLEMP. Did you have representatives of the Navy on this War Plans Board that you spoke of?

Maj. GARLINGTON. Not in the War Plans Division. That is the War Plans Division of the General Staff, but members of that division are also members of the joint Army and Navy board, and that joint Army and Navy board considers these projects for coast defense before the War Plans Division takes its final action.

Mr. SLEMP. Thereby you establish a coordinated relationship between the Army and Navy?

Maj. GARLINGTON. Yes, sir.

APPLICATION OF RADIO TO COAST DEFENSES.

Mr. SLEMP. What is the latest development of radio as applied to the coast defenses? I think we should have that information in connection with the estimates for fire-control installations, etc., in a large number of batteries. What is the result of your investigation of that subject during the past year?

Maj. GARLINGTON. The details of that would have to be given by a representative of the Chief of Coast Artillery's office.

Mr. SLEMP. Gen. Coe, can you give us your views as to the radio situation. In reading over the hearings before the Senate committee on the Army bill of last year I find, on page 200, that it was brought out that a method of communication between troops and their commanders, in the event the wires were destroyed, had been developed. As I understand it, the Army worked out a means of radio communication, the apparatus weighing 25 pounds in one case, storage battery weighed 35 pounds additional. As I understand it, when necessity arose communication was had by means of this wireless apparatus with the commanding officers in the rear, so that no losses occurred by reason of interrupted wire communication. It seems that that was developed under the stress of war. It appears that you are asking a good deal of money in this bill for fire-control apparatus, which involves expensive structures, cable, etc., and it occurred to me that the radio might be utilized to some extent, with a consequent reduction of expenditure.

Gen. COE. I do not know the testimony you have reference to, but it was not given by the Coast Artillery.

Mr. SLEMP. I am referring to a means developed of communicating between troops in the field and their officers and the adaptation of the radio to this fire-control proposition.

Gen. COE. I think I can tell you something about that. We have been working on the proposition of wireless communication between stations in the Coast Artillery, and in some cases we have used it in target practice. In some cases we have had exceptionally satisfactory results, but we have not been able to protect it from any interference. We have at some points found great difficulty in maintaining communication, even where there was no artificial interference, due to the "static" condition of the atmosphere. I think it can be improved upon a great deal, and there have been reports from the coast defenses that indicate improvements are being made, but we are not yet at a point where we would feel at all justified in believing it will do away with cable entirely. We would like very much to do

it, but we can not say to-day that we are certain of communicating between two stations, even a mile or a few miles apart.

Mr. SLEMP. Who has been making these experiments?

Gen. COE. The development of wireless apparatus is entirely in the hands of the Signal Corps. The experiments that I referred to are being carried out by the Coast Artillery, and for that we are using service material furnished by the Signal Corps.

Mr. SLEMP. At what points did you make the experiments?

Gen. COE. At all stations in the coast defense where we could get the apparatus. We equipped as many coast-defense stations as we could.

Mr. SLEMP. Where, for example?

Gen. COE. As I remember, at 24 different coast-defense stations.

Mr. SLEMP. You have not been able at all times to protect the communications from interference?

Gen. COE. No, sir. At first we had a great deal of trouble in establishing communication, but as improvements have been made, and as our experience has been perfected, we have had better results, but we have in no case been able to maintain uninterrupted communication, due either to artificial interference or to the natural condition of the atmosphere. We have not been able to do that for any considerable length of time. We might do it for a few minutes, or, perhaps, for an hour.

Gen. BEACH. I would like to make one statement with regard to the development that is going on now in all classes of ordnance work and electrical matters affecting the location of vessels, etc., which shows that it is pretty difficult not to fall behind without discarding a good many things. Each development that comes places us at a disadvantage unless we secure the same thing or make the changes which its introduction compels. I was told the other day that they can now locate the position of vessels by radio calls. For instance, they are perfecting instruments which they believe will soon be available for use which will give the exact location of a vessel by sending out radio calls. They are proposing to install stations for that purpose on the Great Lakes, so that if a vessel sends out a call it will be received at a shore station and the exact bearing or direction of that call is taken. It is received at another station, and the exact bearing of that call will be located at that station. Then both of those stations send back the bearing, and the intersection of the two being known enables the vessel to plot its location.

They expect to get all of the calls back inside of three minutes. The Lake Carriers' Association, which operates a large number of vessels on the Lakes is making its plans so that the vessels can operate in the heaviest fog and keep their positions accurately determined. That is only one instance of a great many developments that are going on, and we have to keep pace with them. While some of them may be for the protection of our own vessels, they can be utilized against us equally well. All of these various improvements and inventions compel us to take measures which formerly we were not required to take, and it was for that reason, or because of the recent developments in all respects that I made the statement that we are now further behind with our fortifications than we have ever been before.

Mr. SLEMP. It was exactly that same idea that prompted me to ask you why, in view of these very remarkable developments in wireless communication, you still ask for a lot of money for expensive cables and structures for communication purposes. Why do you wish to make all this permanent installation at a time when these other very marvelous developments are coming to pass?

As I understand it, it was proven in the stress of war that organizations that were lost or cut off from any wire communication, even when the ordinary wireless apparatus had been destroyed and despite all the interference that was possible in actual warfare, were yet able to communicate in every instance with their headquarters. In spite of these marvelous developments, you are still asking for a lot of this money to be used in keeping up old time installations just as though nothing in the way of new development had taken place at all.

Gen. BEACH. I would take exception to the statement that interference is impossible, because I know that you can produce a good deal of interference. The means of communication that you are to depend upon in time of a battle must be not only foolproof so far as you can make them—that is, with regard to the men becoming excited—but they must be proof against any interruption or interference that the enemy may be able to produce, and must be reliable under all the stress of weather and climate, or of anything else which may occur.

Mr. ANTHONY. At the beginning of the war we were given an almost perfect demonstration of communication between airplanes and men by means of wireless telephones. That was very successful, but I have yet to see an officer who will state that that sort of communication would be at all times successful in time of battle when there are interruptions.

Gen. BEACH. We also know that when there is a very marked aurora borealis or electrical display all of your wireless communication becomes more or less inefficient, and that is sometimes the case for several hours. I was simply inviting attention to the fact that at various times we have had our fortifications, as you might say, at the front of fortifications for the whole world, but as developments have gone on, they have become obsolete just the same as have our old stone forts which you find at a number of harbors in this country and which were in their day regarded as the best examples of fortifications in existence. As a result of the recent war, naval armament and its accessories have gone forward so fast that we have not caught up with it in our fortifications.

Gen. COE. I would like to add that the Coast Artillery, being held responsible for the handling of these 16-inch guns and other armament, feel their responsibility very keenly, and we could not justify saying to you that we would get along with a wireless fire-control system when we knew it might break down at a critical time. We must have continuous and absolute communication and it must be insured by the expenditure of the small amount of money which is necessary for fire control, otherwise you have thrown away absolutely every bit of money that you put into the guns, carriages, and ammunition, which amounts to millions of dollars, as compared to thousands for the fire control. I would very gladly welcome the supplanting of

the cables by wireless, and some day that may be done, but not to-day.

Mr. SLEMP. That is the point I wished to bring out, whether any real experimentation was being made on that proposition.

Gen. COE. The Coast Artillery has nothing to do with the development of that apparatus; we have not the experts to do that; but we take the developed apparatus and test it practically, just as thoroughly as we can, with the results which I have stated. The cost of the apparatus which we use is very materially greater than the figures you have mentioned.

ENGINEER DEPARTMENT.

CONSTRUCTION OF GUN AND MORTAR BATTERIES.

Mr. SLEMP. The first item in the bill is "For construction of gun and mortar batteries, including railroads and other facilities necessary for the installation of railway and antiaircraft artillery." You are asking \$742,482 for the coming fiscal year, and you had \$1,800,000 for the last fiscal year. First, please state your balances.

Maj. GARLINGTON. You want to get at the unexpended balance?

Mr. SLEMP. I wish to know the amount of money you have expended this year, for what purposes, the unexpended balance, and the unallotted balance.

Maj. GARLINGTON. The latest date at which we have a financial statement is December 31, 1920; on that date we had expended \$467,699.30, so that the cash available on that date was \$1,332,300.70.

Mr. SLEMP. How much of that is allotted?

Maj. GARLINGTON. I have the figure the other way. The amount allotted has been \$942,988.94.

Mr. SLEMP. Does that include the \$467,699.30?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. That would leave a balance unallotted for this fiscal year——

Maj. GARLINGTON (interposing). Of \$857,011.06. That is as of December 31.

Mr. SLEMP. I suppose you are not going to spend all of the \$857,011.06 during this fiscal year.

Maj. GARLINGTON. I do not think we will do so.

Mr. SLEMP. I assume that the reason you will not expend all of this money is that you are studying the best type of emplacement and the most economical expenditure of the funds available consistent with the national defense.

Maj. GARLINGTON. That is exactly the case. You will remember that we stated before the committee last year that even though a large amount was appropriated none of it would be spent until we had determined those facts, and it has taken longer to determine them than we hoped for at the time.

Mr. SLEMP. I wish to compliment you gentlemen for your action in that regard.

Maj. GARLINGTON. I think the chief of the Coast Artillery and the Chief of Engineers last year understood that thoroughly, and that is the basis on which we have worked.

Mr. SLEMP. When did you finally complete your studies of the types of emplacement?

Maj. GARLINGTON. The decision in the matter of the Boston defenses was some time in October. That at southern New York was as late as December, and for the entrance to Chesapeake Bay the matter is now before the War Plans Division, the dispersed type being recommended in that case.

CURRENT YEAR ALLOTMENTS.

Mr. SLEMP. In what way has the money been expended this year?

Maj. GARLINGTON. At Portland, Me., for the completion of the 12-inch battery.

Mr. SLEMP. How much are you going to spend on that?

Maj. DARLINGTON. The allotment during the fiscal year at that place has been \$9,500.

Mr. SLEMP. Will that money be expended?

Maj. GARLINGTON. Yes, sir; that will be required to complete that battery.

Mr. SLEMP. That will be within your estimate of last year, because you estimated you needed \$10,000.

Maj. GARLINGTON. Yes; I remember that for that battery that was the amount. For the completion of the 12-inch battery at Hog Island, \$150,500 was allotted.

Mr. SLEMP. Will that complete the battery there?

Maj. GARLINGTON. That will not complete the battery; no, sir. That is one of the points where money is being requested for next year.

Mr. SLEMP. How much money will be required to complete the Boston project?

Maj. GARLINGTON. We are asking \$47,000 for next year for that Hog Island battery; and \$15,000 for the Nahant battery.

Mr. SLEMP. Will they be completed by the expenditure of those respective amounts?

Maj. GARLINGTON. In the fiscal year 1922; yes, sir.

Mr. SLEMP. This also proves what we were talking about a while ago, that when you get started on a project you never know whether to go on with it or stop it. You are completing the 12-inch gun emplacement at that place and yet you know you have a much more efficient type of gun in stock.

Maj. GARLINGTON. At Boston we are building the gun block so that it can take a 16-inch barbette carriage; it is being built for a 12-inch carriage, but with the bolts set and the concrete so constructed that it can be altered, with practically no expense, to take a 16-inch gun.

Mr. SLEMP. Would that apply also to the 14-inch guns?

Maj. GARLINGTON. No, sir; because the location of those batteries at Boston is such that if any heavier armament were emplaced it should be the heaviest; that happens to be a locality where the heaviest armament available ought to be emplaced.

Mr. SLEMP. As a matter of fact, you would not put 12-inch guns there at all if you did not have a surplus of 12-inch guns?

Maj. GARLINGTON. I think as to that particular place that can be stated, but that does not apply to all of them. New Bedford, completion of 12-inch battery, allotted \$19,500. That will complete the work. Narragansett Bay, construction of six antiaircraft emplacements, \$12,000.

Mr. SLEMP. What do they cost each?

Maj. GARLINGTON. Each of those costs \$2,000, and there are six of them.

Mr. SLEMP. Is that new work?

Maj. GARLINGTON. That was new work; yes, sir.

Mr. SLEMP. It costs about \$2,000 to install an antiaircraft gun.

Maj. GARLINGTON. Not ordinarily, but that particular place required a larger expenditure than in the ordinary case. Ordinarily it costs about \$1,000 for each gun block.

Mr. SLEMP. Why did you stop at six?

Maj. GARLINGTON. The available number of antiaircraft guns determined the number of fixed emplacements to be constructed; a good many mobile antiaircraft guns are available and are also being distributed.

Mr. SLEMP. Did you consider it wise to put money on antiaircraft emplacements under those circumstances?

Maj. GARLINGTON. I think it is a very necessary expenditure.

Mr. SLEMP. They would not offer any real substantial protection.

Maj. GARLINGTON. An antiaircraft gun?

Mr. SLEMP. That number.

Maj. GARLINGTON. Unsupported they would not.

Mr. SLEMP. Practically none, would they? Those antiaircraft guns were put there more for experimental use.

Maj. GARLINGTON. They are to protect the batteries; they are not to protect anything except the batteries at which those guns are put.

Mr. SLEMP. They are not to protect that civilian center?

Maj. GARLINGTON. No, sir; the guns in question are not intended for that purpose; each gun is intended for the local defense of each battery.

Mr. SLEMP. Have you ever figured how much would be required, in the way of antiaircraft guns and installation, to protect a center like New York or Boston?

Maj. GARLINGTON. I do not think that has ever been referred to the Engineer Department for study. Long Island Sound, for work on the 16-inch emplacement at Fort Michie, \$400,000 has been allotted.

Mr. SLEMP. Does that complete the work at Fort Michie?

Maj. GARLINGTON. The work at Fort Michie will be completed during the next fiscal year.

Mr. SLEMP. This or the coming fiscal year?

Maj. GARLINGTON. We are asking for more money; that is, to carry on the construction work we are asking for more money for that gun in the next fiscal year.

Mr. SLEMP. But you expect to complete it during the next fiscal year?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. Will you complete it within the limit of cost originally estimated?

Maj. GARLINGTON. I think that cost was increased somewhat over the original estimate.

Mr. SLEMP. Were your estimates for the construction of emplacements and other construction work next year based upon the present labor cost and the present cost of materials?

Maj. GARLINGTON. The estimates for next year for this work were based on existing prices, but are only for carrying on the work during one fiscal year; that is, they are a very small part of the total.

Mr. SLEMP. At Fort Michie, you have a disappearing gun?

Maj. GARLINGTON. That is one gun with a disappearing mount: yes, sir.

Mr. SLEMP. Have you the gun for that?

Maj. GARLINGTON. Yes, sir; that gun has been sent to the proving ground and is being mounted for proof fire at the proving ground some time in June, I understand. Those tests are carried out under the Ordnance Department.

Mr. SLEMP. Have you any other 16-inch guns being delivered to the Engineer Department for installation?

Maj. GARLINGTON. No, sir.

Mr. SLEMP. That is the only one?

Maj. GARLINGTON. That is the only one, and that has not yet been delivered to us. As I say, it is still in the hands of Ordnance and will be proof-fired sometime in June, I understand.

Mr. SLEMP. Have you had any report as to when you are likely to get other guns of that size?

Maj. GARLINGTON. I think the Ordnance will present the dates of delivery at this hearing. I am not familiar with them. Delaware River, construction of the 12-inch long-range battery, \$14,700 allotted.

Mr. SLEMP. You did not make any estimate for that?

Maj. GARLINGTON. No, sir; that battery was not completed within last year's estimates, and it was necessary to allot funds to it from the general appropriation in order to complete it; it has been completed and transferred to the Artillery. Cape Fear, reinstallation of four mortars, \$4,260.94.

Mr. SLEMP. You did not make any estimate for that last year?

Maj. GARLINGTON. No, sir; that is current work, to which funds have been allotted.

Mr. SLEMP. Should you not have made that suggestion last year when you came before the committee and asked for the appropriation of money for certain uses?

Maj. GARLINGTON. It has been customary to utilize this appropriation for necessary work on existing defenses that are clearly within the terms of the appropriation.

Mr. SLEMP. There would not be any use, then, of making any itemized estimate?

Maj. GARLINGTON. Well, the estimate submitted last year only covered the new construction, I think.

Mr. SLEMP. It covered the distribution of the total amount of money asked for, \$2,900,000.

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. And you have gone outside of what you submitted last year.

Maj. GARLINGTON. That holds good as to that item; yes, sir. There is another item exactly similar to it at Charleston, S. C., where mortars were reinstalled at two of the batteries at Fort Moultrie, \$20,000.

Mr. SLEMP. What about Fort Hancock?

Maj. GARLINGTON. I do not see any allotment here for Fort Hancock.

Mr. SLEMP. Is that a completed battery?

Maj. GARLINGTON. The batteries there have been practically completed, but they have not been turned over to the Artillery.

Mr. SLEMP. What is the occasion for the delay? You did not spend any money on them this year?

Maj. GARLINGTON. Since this statement has been prepared the district engineer has made a report on the status of those batteries and requested a small allotment of a few thousand dollars to put them in shape for final transfer. At Pensacola, Fla., the sum of \$820 was allotted for the final work on the 12-inch battery.

Mr. SLEMP. You carry that in next year's estimate?

Maj. GARLINGTON. That is stricken out on account of this allotment. Galveston, Tex., \$28,820 allotted for the completion of the 12-inch batteries at Crockett and Travis.

Mr. SLEMP. That is the amount of money you estimated for last year?

Maj. GARLINGTON. I do not remember whether that is the exact amount.

Mr. SLEMP. Will that complete those batteries? Will they be turned over to the Coast Artillery with that amount of money?

Maj. GARLINGTON. We expect that that amount of money will complete the work. But while on that subject, at Fort Travis there have been difficulties encountered due to the settlement of the battery, and work is suspended there just at present until the amount of settlement can be determined before putting on the sand fill; but it is not a serious matter and it is expected we will complete it by June. However, if that settlement should continue and some serious trouble develop it might be that we would come back with an estimate next year.

Mr. SLEMP. I wish to correct myself about Fort Crockett and Fort Travis; you only asked for \$15,000 to complete that work, and if I understand your statement you are asking for about \$28,000?

Maj. GARLINGTON. We are not asking for that amount, but we allotted \$28,000. At San Francisco, construction of 12-inch battery, \$19,520.

Mr. SLEMP. Is that completed?

Maj. GARLINGTON. By the time that is all spent it will be completed.

Mr. SLEMP. You estimated last year it would take \$75,000 to complete it. Have you changed your plans there?

Maj. GARLINGTON. There has not been a change of plans but the amount of the estimate was in error by that amount. At Columbia River, the completion of the mortar battery at Fort Canby, \$42,000.

Mr. SLEMP. You did not estimate for that at all last year?

Maj. GARLINGTON. No, sir.

Mr. SLEMP. Why did you not estimate for it?

Maj. GARLINGTON. The mortar battery at Fort Canby settled in a very serious way; the foundation proved to be entirely inadequate,

and a very elaborate system of underpinning had to be put in in order to be able to put on the necessary sand fill and complete it. That was an unforeseen expenditure entirely.

Mr. SLEMP. Would the language of the appropriation justify the use of money for emergencies in that way?

Maj. GARLINGTON. That has been the way the appropriation has been handled right along, I have been informed, ever since my connection with the Chief of Engineers' office.

Mr. SLEMP. Will you get that battery in shape by the end of this fiscal year?

Maj. GARLINGTON. We estimate now that we will have it completed by April of this year.

Mr. SLEMP. That was a completed battery, if I understand correctly?

Maj. GARLINGTON. It was not completed at the time the settlement was observed; no, sir.

Mr. SLEMP. It had not been turned over and accepted by the Coast Artillery?

Maj. GARLINGTON. No, sir.

Mr. SLEMP. Have we any other mortar batteries along the United States coast in that shape; that is, not turned over? I thought they were all turned over.

Maj. GARLINGTON. This is the only one not turned over, and we are not building any of these now.

Mr. SLEMP. Of these 12-inch batteries how many are not turned over or will not be turned over to the Artillery by the end of this fiscal year?

Maj. GARLINGTON. Four. The balance of the amount of money allotted, which I have not read to you, was allotted for fixed anti-aircraft gun blocks and for several small items in connection with the gun battery construction. I gave you the major items.

Mr. SLEMP. Did you give the amount you proposed to expend on the 16-inch gun emplacements during this fiscal year?

Maj. GARLINGTON. Not in that statement; no, sir.

Mr. SLEMP. You had better take that up before you go into the antiaircraft item.

Maj. GARLINGTON. The only places to which we have allotted money for 16-inch gun work are Fort Michie and Fort Tilden, southern New York, with certain small preliminary allotments to Chesapeake Bay and to Boston for Calf Island emplacements.

Mr. SLEMP. How much at each of those places?

Maj. GARLINGTON. I do not think I have that here because those allotments were all made after December 31. I should not say all of those because the Fort Michie one, of \$400,000, has been allotted for some time; we recently made an allotment of \$70,000 for Fort Tilden, and allotments to the amount of \$5,000 have been made to Chesapeake Bay and Boston.

Mr. SLEMP. Those allotments have been made for the purpose of carrying on preliminary surveys, I suppose.

Maj. GARLINGTON. Yes; for surveys and foundation tests.

Mr. SLEMP. At Fort Michie you are spending \$400,000 this fiscal year. How much more will be required to complete the work there?

Maj. GARLINGTON. \$140,000.

Mr. SLEMP. That would be far within your estimate?

Maj. GARLINGTON. That would be within it. I think the original estimate was in the neighborhood of \$1,200,000.

Mr. SLEMP. You stated last year that \$850,000 was necessary to complete that battery?

Maj. GARLINGTON. Yes, sir; that was the figure. We had already spent from the prior appropriation \$292,000.

Mr. SLEMP. At that rate, your theory is that it will be within the estimate?

Maj. GARLINGTON. Just about.

Mr. SLEMP. My experience in this committee has been that there has always been a hang over just to complete; can you figure it out really to complete—you expect to complete it next year with \$140,000 and deliver it to the Coast Artillery?

Maj. GARLINGTON. We do at this time. That is, of course, very difficult, when we are always confronted with estimating a long time in advance as to when it will be completed.

Mr. SLEMP. With a falling market for labor and material you ought to do it.

At Fort Tilden you are just beginning, you are spending how much there this year?

Maj. GARLINGTON. We have allotted \$70,000.

Mr. SLEMP. Have you spent anything there before?

Maj. GARLINGTON. Not for 16-inch emplacements.

Mr. SLEMP. What is to be the cost of the Fort Tilden emplacement?

Maj. GARLINGTON. The details of the magazines to be provided have not been worked out so that the figure I give you will be only an approximate estimate, but we estimate at this time that it should be about \$300,000.

Mr. SLEMP. Would that be the total cost?

Maj. GARLINGTON. Yes, sir. That figure is intended to cover—

Mr. SLEMP (interposing). Last year you said that you thought it would probably cost \$1,150,000 for the battery at Fort Tilden, two 16-inch guns?

Maj. GARLINGTON. At that time we expected to put in a heavily protected concrete structure.

Mr. SLEMP. The block emplacement does not in any way interfere with the range of the gun?

Maj. GARLINGTON. No, sir.

Mr. SLEMP. It is for the protection of the gun, the ammunition, and the auxiliaries that go with the battery?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. And the fire control?

Maj. GARLINGTON. Yes, sir. At this site our present study indicates that that will be protected by concrete and earth parapets. The plans have not been completed for the plotting room, power room, and switchboard room. It is so flat that there is no natural protection. That is on Rockaway Beach.

Mr. SLEMP. The purpose is to give additional protection to New York City?

Maj. GARLINGTON. The purpose of the battery at Fort Tilden?

Mr. SLEMP. Yes.

Maj. GARLINGTON. That is at Rockaway Beach?

Mr. SLEMP. Yes.

Maj. GARLINGTON. It is for the defense of southern New York.

Mr. SLEMP. The defense for Long Island Sound is at Fort Michie?

Maj. GARLINGTON. Yes, sir; Fort Michie is for the protection of Long Island Sound.

Mr. SLEMP. General, I should like to ask whether you have changed your view with regard to the mining of Long Island Sound?

Gen. COE. There has been no change.

Mr. SLEMP. Have you made any investigation during the year of that subject?

Gen. COE. Yes, sir. We have been carrying on extensive experiments in Puget Sound, where conditions are not dissimilar. As regards Fort Michie, the general trend of the experiments is to the effect that the mining is possible, but that it is very difficult, very expensive, and problematical in its results.

Mr. SLEMP. You have made no expenditure for this fiscal year on any 16-inch howitzer emplacement?

Maj. GARLINGTON. No, sir; other than the preliminary work at Chesapeake Bay.

Mr. SLEMP. Will you put howitzers there?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. You will not put howitzers at Boston?

Maj. GARLINGTON. Both Boston and Fort Tilden will have guns.

ANTI-AIRCRAFT DEFENSES.

Mr. SLEMP. How much are you spending on the anti-aircraft emplacements this year?

Maj. GARLINGTON. I have not the data for the remainder of the year.

Mr. SLEMP. How much money do you expect to expend for such emplacements?

Maj. GARLINGTON. There remains under the project adopted about 10 or 15 blocks.

Mr. SLEMP. The project adopted by whom?

Maj. GARLINGTON. By the War Plans Division of the General Staff.

Mr. SLEMP. When was that done?

Maj. GARLINGTON. Some time during the summer of 1920, April 2, 1920; just between the hearings and the appropriation last year, just about that time.

Mr. SLEMP. It was not submitted in any way in any of the hearings?

Maj. GARLINGTON. It is for the utilization of the armament left on hand after the war.

Mr. SLEMP. You did not ask for any money for that purpose?

Maj. GARLINGTON. It was not asked for last year.

Mr. SLEMP. How much money are you proposing to spend on that project for which you did not ask money last year?

Maj. GARLINGTON. That would have to be totaled from the details of this statement.

Mr. SLEMP. I would suppose that it would be about \$30,000?

Maj. GARLINGTON. It would be the balance between those items which I read to you and the total allotted of \$942 000, except the allotments we make between this time and the end of the year. It would be some such figure as you have mentioned.

Mr. SLEMP. If you are going to install 10 or 15 and they cost \$2,000 each, it will be \$20,000 or \$30,000?

Maj. GARLINGTON. Yes, sir. As I said, the figure of \$2,000 at Narragansett Bay is higher than the average. The average has been somewhere around \$1,000.

Mr. SLEMP. You are putting in these antiaircraft emplacements at various batteries?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. To give protection to the battery?

Maj. GARLINGTON. To give local protection to the battery itself.

Mr. SLEMP. You are not equipping all the batteries in the United States?

Maj. GARLINGTON. No, sir. At each coast defense there will be a certain antiaircraft defense in order to utilize to the best advantage the antiaircraft material left over from the war. That includes a certain number of fixed guns and a certain number of mobile guns. They have been assigned to all the coast defenses.

Mr. SLEMP. It would really have been better form if you had submitted this last year as the contemplated expenditure?

Maj. GARLINGTON. It would have been, if the constructing services had had orders from the War Department that the work had to be attended to.

Mr. SLEMP. I know, but in any event you should not have spent nor obligated the money until you had submitted an estimate?

Maj. GARLINGTON. Yes, sir. You will see the change of language——

Mr. SLEMP (interposing). That is for next year. I am talking about this present fiscal year.

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. I have before me a statement of all the contemplated expenditures for this fiscal year, and not a single item in it refers to that sort of emplacement.

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. It does not amount to very much, but the principle is involved.

You stated last year that all the items you mentioned for 12-inch guns would be completed during this fiscal year?

Maj. GARLINGTON. No, sir. You will find that at Boston we knew that it would take two years more.

Mr. SLEMP. What contemplated expenditures have you for the coming year?

DETAILS OF ESTIMATE.

Maj. GARLINGTON. We estimate for battery construction for 1922 \$742,482, which contemplated two 16-inch emplacements at Boston, \$200,000; Long Island Sound, work on the 16-inch gun at Fort Michie, \$140,000; southern New York, two 16-inch guns at Fort Tilden, \$260,000; completion of the 12-inch battery at Hog Island, \$47,000; completion of the 12-inch battery at Nahant, Mass., \$15,000; antiaircraft shelters at various points, \$64,812, and miscellaneous, \$8,250.

BOSTON HARBOR.

Mr. SLEMP. Please tell us somewhat in detail about Calf Island and Boston Harbor?

Maj. GARLINGTON. It is expected to build the wharf and begin construction operations with the current 1921 funds. The preliminary plans for the wharf and the preliminary plans for the emplacement have already been prepared. The estimate for next year is to do as much work as those funds will enable us to do at that point.

Mr. SLEMP. What is the total cost of the Calf Island project expected to be?

Maj. GARLINGTON. The battery itself, \$850,000, and the provision for the wharf, necessary landing facilities, \$350,000, making a grand total of \$1,200,000.

Mr. SLEMP. The money to be expended on this project during the coming fiscal year will be the first money?

Maj. GARLINGTON. No; we expect to secure an allotment this fiscal year to start work on the wharf in the spring. That is where a part of that balance of money will go that we were talking about.

Mr. SLEMP. How many years do you expect it will take to complete that work?

Maj. GARLINGTON. That will probably take from three to four years.

Mr. SLEMP. This evidently is not simply a block?

Maj. GARLINGTON. No; that is the one I referred to as the old type of emplacement due to the small area of this island where it was necessary to place the guns.

Mr. SLEMP. How large is the island?

Maj. GARLINGTON. Roughly, 20 acres, some small site like that; the exact amount I have not before me.

Mr. SLEMP. The area would not be sufficient to justify other than the old type of emplacement?

Maj. GARLINGTON. It is one of the places to which Col. Sherrill made a trip during the summer and he investigated the possibilities of that kind of an emplacement there.

Mr. SLEMP. Is it considered absolutely necessary to protection?

Maj. GARLINGTON. It is so considered; yes, sir. A location on other islands was considered, but after a study during the last summer that was the final decision, to stay on that island.

Gen. COE. I think it was mentioned in the hearings that we contemplated using the Navy turrets, but we found the expense of that would run over \$3,000,000 and we had to drop it on account of the expense.

Mr. SLEMP. This is really the cheapest form of construction for those guns?

Maj. GARLINGTON. At that place; yes, sir.

Gen. COE. Or at any place where they would perform the same service.

Mr. SLEMP. It is for the better protection of Boston?

Maj. GARLINGTON. Boston Harbor.

Mr. SLEMP. As I understand, you expect to complete Fort Michie in the next fiscal year with \$140,000?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. What about the work at Fort Tilden?

Maj. GARLINGTON. That money, with the money we will allot this year, should complete Fort Tilden.

Mr. SLEMP. That should be completed?

Maj. GARLINGTON. That is one of the dispersed type, where the construction is relatively simple.

Mr. SLEMP. What amount of money will be spent at Fort Tilden?

Maj. GARLINGTON. That is the point where I gave an approximate estimate of \$300,000, qualifying it by the statement that our plans for the power plant and magazines had not been worked out.

Mr. SLEMP. This program of 16-inch guns involves five 16-inch guns altogether?

Maj. GARLINGTON. In that connection, when these estimates were submitted, the decision to place four howitzers on Chesapeake Bay had not been reached, but it is before the war Department now for approval with the idea that preliminary work will be done this year out of present funds and carried on with whatever funds you do provide for battery construction next year. At the time these estimates were submitted to Congress we had not progressed that far. I should like it to appear in the record that a part of next year's funds would be applied to Chesapeake Bay.

Mr. SLEMP. Chesapeake Bay?

Maj. GARLINGTON. Yes, sir; having undertaken it.

Mr. SLEMP. Have you any other place where you would begin work for the installation of 16-inch howitzers?

Maj. GARLINGTON. Not at the present time. I think the confidential letter to the committee asked for authorization to apply the funds as the priorities of the manufacturing program might best justify, but those I have now mentioned are the only ones in mind at the present time.

Mr. SLEMP. You will not have 16-inch guns actually delivered by the War Department during the next fiscal year to supply the batteries where you have your emplacements completed?

Maj. GARLINGTON. Only one probably will be completed next year and that will be the one at Fort Tilden. I think you will find that some 16-inch guns will be delivered during the next fiscal year.

Mr. SLEMP. I thought you would complete the Fort Michie battery?

Maj. GARLINGTON. That gun is ready.

Mr. SLEMP. You have only one gun there?

Maj. GARLINGTON. That is only a one-gun battery; yes, sir.

ANTIAIRCRAFT GUN SHELTERS.

Mr. SLEMP. With regard to these antiaircraft shelters, have you enough antiaircraft guns on hand for them?

Maj. GARLINGTON. Yes, sir; this is to take care of the material that became available as a result of the war.

Mr. SLEMP. What kind of an emplacement do you provide for them?

Maj. GARLINGTON. It is a platform of concrete with the necessary bolts and reinforcement, about 30 feet in diameter, as I recall it.

Mr. SLEMP. Is not \$1,000 a pretty heavy cost for a little block of concrete?

Maj. GARLINGTON. There is a great deal of concrete in it to give it the necessary stability, and the transportation to an isolated site like that is what runs up the cost relatively high.

Mr. SLEMP. These are 3-inch guns?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. That ought not to require very much?

Maj. GARLINGTON. Some of these blocks have been built for as little as \$500. The one I referred to happens to be one of the highest, being on an island where the transportation cost was heavy.

Mr. SLEMP. You wish money set aside next year for these shelters?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. What is the difference between the shelters and the emplacements for antiaircraft guns?

Maj. GARLINGTON. The emplacements are for fixed guns and the shelters are for mobile guns, which are being provided. In that connection I should like to say that we have not utilized money from this appropriation for any shelters this year. We did use some, as I told you a little while ago, for building blocks, because we felt that the language of the appropriation justified it, but we did not go into the construction of any shelters for mobile antiaircraft guns out of this appropriation.

Mr. SLEMP. You are not asking for any money for antiaircraft gun emplacements next year?

Maj. GARLINGTON. No, sir; we will have completed them all this year.

Mr. SLEMP. You are asking for shelters?

Maj. GARLINGTON. For shelters for the mobile antiaircraft guns being supplied the coast defenses.

Mr. SLEMP. Please describe the shelters.

Maj. GARLINGTON. A shelter corresponds exactly to a light type of garage for an automobile. In some cases they are built of wood and in some cases of frame and galvanized iron.

Mr. SLEMP. What is the purpose of them?

Maj. GARLINGTON. To shelter the guns, possibly the gun and tractor as the case may be, from the elements.

Mr. SLEMP. Why not shelter the ones on the fixed emplacements from the elements?

Maj. GARLINGTON. There is no independent motive power with the fixed guns, and you can put a canvas cover over the breech and muzzle of the gun, and the paint protects the rest of the gun, but with the mobile gun it is on a truck with a gasoline motor just like an automobile..

Mr. SLEMP. Have you a lot of them in stock now?

Maj. GARLINGTON. It runs up to about 100 or 150, I do not recall.

Mr. SLEMP. You have them thoroughly well sheltered now?

Maj. GARLINGTON. They are in the depots, but they are to be sent out to the coast defenses and shelter at the coast has to be provided for them.

Mr. SLEMP. Have you examined the storage facilities at the different localities?

Maj. GARLINGTON. At each place; yes, sir. They were required to go to the coast defense commander and he was required to put in writing on the district engineer's report whether or not shelter was available for them.

Mr. SLEMP. What was the result of the reports?

Maj. GARLINGTON. Quite a number reported that space was found to be available in existing garages or storehouses.

Mr. SLEMP. You will send all of the 150 out to these various posts?

Maj. GARLINGTON. I used that number only as an approximate number.

It seems that we are providing shelter, or the money to provide shelter, for 117 next year.

Mr. SLEMP. What does one of those shelters cost?

Maj. GARLINGTON. I will read off a few items: At Portsmouth, N. H., for four guns, \$3,200.

Mr. SLEMP. Does that provide for four shelters?

Maj. GARLINGTON. No, sir; one building with room for all of them.

Mr. SLEMP. Then, this is a storage proposition?

Maj. GARLINGTON. It is to put them at places where they may be needed. At some coast defenses, of course, you would have separate structures, but in certain other cases there would be combined structures. It would be dependent upon the location.

Mr. SLEMP. You would only need them at coast defenses for experimental purposes?

Maj. GARLINGTON. No, sir; these have been allotted to the coast defenses as a part of the permanent armament.

Mr. SLEMP. Are you sending any of them to places where you have fixed antiaircraft gun emplacements?

Maj. GARLINGTON. In some places the project calls for some of both types. In most cases that is true. Some have fixed mounts and some are mobile.

Mr. SLEMP. Did you say that the War Plans Division has decided on this?

Maj. GARLINGTON. Yes, sir; the program was communicated to us with instructions to prepare gun blocks for the fixed guns and shelter for the others.

Mr. SLEMP. That is a new proposition, so far as this committee is concerned. Would it not be a good idea to put in the hearing a statement of the reasons for this conclusion or decision?

Gen. COE. That could be stated right now. The end of the war found us with certain antiaircraft artillery which was allotted, as had been approved by the General Staff, to the various coast defenses, the purpose of the allotment being twofold: First, for training and experimental purposes, largely for training purposes, the experimental work being carried on at the Coast Artillery training centers at Fort Monroe and Camp Eustis. The second general purpose was to distribute this material where it would be effective, or as effective as that limited amount of artillery could be, in the protection of the fortifications and of the cities which they protect. In the location of these guns, the question of the general protection of the locality was considered rather than the protection of the armament itself. Although we put the fixed guns on ground which we already owned, so as to avoid the purchase of ground, where the best protection that could be afforded by this limited amount of artillery could be secured better by putting it upon ground that we did not own, we assigned for that purpose mobile armament. Of course, the number of guns we now have, which only amounts to some 300, is rather insignificant when compared with the real need for antiaircraft

defense for the Atlantic and Pacific coasts and the insular possessions. This includes the insular possessions as well as continental United States.

Mr. SLEMP. Where are these antiaircraft mobile guns now located? Have you got them in storage, or have you sent them out?

Gen. COE. They have been sent out.

Maj. GARLINGTON. Some of them have been sent out and some of them are held. In cases where they had the shelter at the post already available, they sent them out.

Mr. SLEMP. Suppose no money was appropriated for shelter this year, what would you do?

Maj. GARLINGTON. That would be a problem.

Mr. SLEMP. Could they improvise something?

Maj. GARLINGTON. They could not well improvise anything that would properly protect them. Leaving material out in open storage has been proven to be pretty expensive.

Mr. SLEMP. The main thing you would want would be to have them at the various schools; that is, at Fortress Monroe and Camp Eustis.

Gen. COE. We will expect to use them for training purposes at all the large coast defenses. In explanation of these fixed antiaircraft guns, a good many of those guns, and, in fact, all of them, were assigned to us during the war for actual use in case of aircraft attack. In many cases they were mounted on ground which was temporarily rented, or, sometimes, not even rented, but simply borrowed from owners in the vicinity. We have now taken away all of those guns from the sites except those that were located on our own property, and the change of location of those guns on our own property causes this expenditure.

Mr. SLEMP. You have not provided any of this antiaircraft defense so far as civilian population, utilities, or things of that kind are concerned? You have spent no money for that, and no appropriation has been made for that purpose?

Gen. COE. Except in this way: The perimeter of the antiaircraft defense of Boston would include in its circumference guns which are now located on the area covered by the coast defense.

Mr. SLEMP. What would be the cost of defending Boston as far as possible by the use of antiaircraft guns against airplane attack?

Gen. COE. I made the estimate that the defense of Boston, taking as a basis one-half of the guns that were installed in the defense of Paris, would cost about \$20,000,000; that is, for the guns and ammunition.

Mr. SLEMP. Do you mean ammunition for the full life of the gun?

Gen. COE. No, sir; the basis was 1,000 rounds per gun.

Mr. SLEMP. If we went into that proposition very considerably, for all the cities of the United States, we would certainly be up against it.

Maj. GARLINGTON. Replying to your question, I have made the calculation. The items stricken out amounted to \$22,420; but the item of \$15,000 required at Nahant did not appear in the original estimates, so that the reduced figure would be \$735,062.

Mr. SLEMP. Did you say that those shelters that you propose to have constructed next year would be on Government property?

Gen. COE. Yes, sir.

Mr. SLEMP. The only thing you could build for that amount of money would be very small wooden structures.

Maj. GARLINGTON. Yes, sir; they would be of the simplest type of shelters. As I have said, as a result of dropping certain items and the insertion of the \$15,000 item for Nahant, the Engineer Department's figures would be \$735,062; but the amount to which we were directed to reduce this estimate as the result of your request, was \$600,000. That is to say, assuming that the total appropriation bill is to be \$15,000,000, the proportionate amount in this item of appropriation would be \$600,000.

Mr. FRENCH. How long does it take to install antiaircraft guns?

Maj. GARLINGTON. It would take a matter of a month or two.

Mr. FRENCH. Then, what is the relative cost of maintaining them in some large storage at accessible points in comparison with this manner of storage, which practically means the building of gun shelters?

Maj. GARLINGTON. I suppose keeping them in some central storage would obviate the cost of these new structures, but the cost of caring for them would be the same in either case. The advantage of having them out at the coast defenses is to enable them to be utilized by the troops as a part of their training in their duties.

Mr. SLEMP. The new construction work that you propose to spend money for this fiscal year will be confined to Fort Tilden and——

Maj. GARLINGTON (interposing). No, sir; those small amounts were the allotments made to those places, but we expect to allot more out of the balance on hand to go ahead with the work at those places.

Mr. SLEMP. How much will you expend at Fort Tilden this year; you will not spend more than you have allotted?

Maj. GARLINGTON. That was only a partial allotment, and if the work progresses satisfactorily the district engineer will ask for additional funds.

Mr. SLEMP. I thought unallotted balance was \$857,011.06?

Maj. GARLINGTON. That was unallotted on December 31; yes, sir; but we expect to make considerable additional allotments.

Mr. SLEMP. You ought to revise your allotment statement; you said that that unallotted balance would be returned to the Treasury.

Maj. GARLINGTON. No, sir; you had not asked that. You asked me whether we would spend all of the money, and I said that we did not expect to spend it all. I evidently misunderstood your question.

Mr. SLEMP. How much of the \$857,011.06 do you purpose to spend?

Maj. GARLINGTON. I have not brought with me, Mr. Chairman, the statement of the contemplated allotments from that fund, but I have the data based on reports from the district engineers, as of December 1, of the amount they will need for the rest of the fiscal year, and can readily submit that if it is desired. In other words, I did not anticipate the necessity of indicating how much could be turned in at this time.

Mr. SLEMP. You would not wish to submit their allotment requests without review by the organization here?

Maj. GARLINGTON. No, sir; we have been working on that since December 1. I have a knowledge of the requirements of the situation, but I did not anticipate that we would be called upon to turn in any of this at this time under this fiscal year appropriation; I thought that we had the money until June.

Mr. SLEMP. You do have it.

Maj. GARLINGTON. I might say this much, that as a result of our studies so far they indicate the probability of not needing some \$300,000 of this appropriation.

Mr. SLEMP. In other words, the question is whether or not you can wisely expend the money given you last year; that is the point.

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. If \$600,000 were allowed under this appropriation head how would you apply it?

Maj. GARLINGTON. To use that \$600,000 to the best advantage, it seems to me, I would retain the entire amount of \$140,000 for the completion of the battery at Fort Michie, so as to get that done. I would allocate to the work at Calf Island \$175,000; at Fort Tilden, \$175,000; and would retain the amount of \$47,000 to complete the Hog Island battery, and would retain the \$15,000 to complete the Nahant battery. That would leave \$48,000 to be applied to the construction of shelters for the antiaircraft guns and those two miscellaneous items.

Mr. FRENCH. There is one phase I wish to develop a little further, and that is the question of labor costs and material costs now in comparison with the costs at the time the estimates were made, and also in comparison with such costs a few years ago. If it would better fit in later on when we come to the general construction work, I will defer my questions until then.

Mr. SLEMP. It will fit in here, except I wish to ask about the 14-inch gun proposition. You contemplate no expenditure of money in connection with 14-inch guns?

Maj. GARLINGTON. Not in the Engineer Department; no, sir.

FOR RAILROADS AND OTHER FACILITIES NECESSARY FOR THE INSTALLATION OF RAILWAY AND ANTIAIRCRAFT ARTILLERY.

Mr. SLEMP. What is the purpose of this new language reading, "including railroads and other facilities necessary for the installation of railway and antiaircraft artillery?"

Maj. GARLINGTON. The language before was limited to the construction of gun and mortar batteries. At that time the emplacements had all of the facilities for the magazines, storage, the protection of platting rooms, etc., right at the guns. That language then covered all of the work that we had to do. Now, we have the dispersed arrangement of magazines and other elements, and it is necessary to put in railroad tracks to connect them up; and also in the installation of railroad guns at seacoast fortifications the connection to existing railroad lines will probably be necessary. It was felt that in order that there might be no question as to the application of the funds from this appropriation to such construction, we ought to include these words, "including railroads and other facilities necessary for the installation of railway and antiaircraft artillery." We have also included, as you will see, antiaircraft artillery. That is because, while an antiaircraft battery is a gun battery, at the same time it involves construction of shelters for the mobile type of guns, in a certain sense not battery, but accessory work. We felt that the language of the appropriation might be broad enough to include this other development, but in order that there might be no question as

to the legality of using the money in that way, we put in that new language that is before you.

Mr. SLEMP. Have you ever built any tracks under this language for the construction of gun and mortar batteries?

Maj. GARLINGTON. We have right at the emplacement, but no extensive construction.

Mr. SLEMP. Did you at Fort Barry?

Maj. GARLINGTON. No, sir; at Fort Barry they use motor trucks for the transportation of the ammunition.

Mr. SLEMP. Did you not construct some tracks there?

Maj. GARLINGTON. No, sir; as I recall the Fort Barry arrangement it was carried over a road on motor trucks.

Gen. COE. There are no tracks there.

Mr. SLEMP. What this involves is the building of railroad tracks to be used in connection with railroad artillery?

Maj. GARLINGTON. Yes, sir; that is it.

Mr. SLEMP. You have not now any scheme studied out as to where you want your railroad lines, or as to the length or cost of them, or anything of that sort; this is just a general blanket proposition to build railroad tracks wherever you want to?

Maj. GARLINGTON. Only for the installation of railroad guns.

Mr. SLEMP. The item reads:

For construction of gun and mortar batteries, including railroads and other facilities necessary for the installation of railway and antiaircraft artillery.

Maj. GARLINGTON. It is limited to the installation of railway and antiaircraft artillery.

Mr. SLEMP. That would involve a pretty extensive program that you have not yet worked out.

Maj. GARLINGTON. No, sir.

Mr. SLEMP. Where would you expect to build railroads if that language were put in?

Maj. GARLINGTON. The defense projects for New York and New England areas that have been submitted to the War Department by the commanding generals in those areas go into the question of the fixed emplacements and fixed fortifications and the use of railroad artillery also. They are studied by the War Plans Division, and in both of those cases the fixed emplacements have been recommended to be supplemented by the use of railroad artillery at certain localities.

Mr. SLEMP. Can you give us the proposition that the War Plans Division has determined upon with regard to the railroad artillery defense in that particular section that you have referred to?

Maj. GARLINGTON. Not having been called upon to prepare any estimates for the construction involved there, I am not in a position to give you those data. That would have to come from some representative of the War Plans Division. I meant to say that the estimates only covered those projects where fixed emplacements have been called for.

Mr. SLEMP. I do not understand that your estimates cover anything on that project, because the itemized statement of the amount of money you propose to expend does not include any railroad proposition of any kind: so that really you are not submitting this language in any relation to the expenditure of this money.

Maj. GARLINGTON. Except where it says for antiaircraft artillery.

Mr. SLEMP. I was wondering where you would get the money from, unless you got it as you did this year without submitting the items to this committee, and by using money that was intended for some other purpose along that line.

Maj. GARLINGTON. I see what you mean.

Mr. SLEMP. You have given an itemized statement of what you propose to do?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. But that itemized statement does not involve the construction of any railroad facilities of any kind?

Maj. GARLINGTON. Not specifically; no, sir.

Mr. SLEMP. It ought not by implication, ought it?

Maj. GARLINGTON. Except in connection with the emplacements at Chesapeake Bay.

Mr. SLEMP. You have a railroad there?

Maj. GARLINGTON. Yes, sir; there is a railroad there, but there might be required the building of spur tracks such as were built when this 14-inch railroad mount was made.

Mr. SLEMP. You did that without any authority at all?

Maj. GARLINGTON. Yes, sir; the money was allotted from the contingent fund under the control of the Chief of Coast Artillery. That was a large appropriation made during the war.

Mr. SLEMP. There is no proposition from the War Department, so far as these estimates are concerned, that involves the use of railroad artillery in connection with the coast defenses, is there?

Maj. GARLINGTON. As presented to Congress?

Mr. SLEMP. So far as any money to be appropriated is concerned?

Maj. GARLINGTON. No, sir.

Mr. SLEMP. That is not to be found anywhere in the bill.

Maj. GARLINGTON. No, sir.

Mr. SLEMP. I suppose there will be something for the maintenance of what you have, and perhaps for your center at Camp Eustis, but you are not proposing to build any railroads or to build any highways that would in any way connect the defense proposition with any new work involving the use of railroad artillery?

Gen. COE. Not on a large scale. There are three different cases that I would like to mention, and I think they will throw some light on what the Engineers had in mind in suggesting the change in the wording of that appropriation. In connection with the 14-inch railroad mount, it was very necessary in order to enable us to go ahead with the new carriage that had to be made to build a spur track. I presume it was not over 300 yards or a half mile of track that was required altogether. In that case, the funds from which the cost was paid were taken from the contingent fund which was appropriated during the war. The next case that came up was in the New England department, a battalion of railroad artillery, 8-inch guns were sent up there for the exercises which the department commander was holding.

He had those guns at Camp Devens where they were used with the mobile troops, and they were later sent to Rockport, Mass., and to Provincetown, Mass., on Cape Cod. In each case we had to get them off the trucks so as not to obstruct the tracks. They could be fired, however, as soon as they were moved off on a short spur track.

We spent something like \$300 at Rockport, and I do not know what the exact figures were at Provincetown.

Maj. GARLINGTON. The total there was \$7,000.

Gen. COE. That was paid from the appropriation for Army transportation. The third case that came up was in the firing at the battleship *Massachusetts* in Pensacola Harbor, where we had to use railroad guns in order to get the range and angle of fall with the 12-inch projectiles, which we wanted in our firing against the deck of the battleship. We fired at 20,000 yards range. There, I think, the expense was the amount of the transportation, but there was a question of the suitability of that sort of charge being made against this appropriation. The suggestion of the Engineer Department would be to cover items of that nature.

Mr. SLEMP. What would be the minimum amount of money that you could get along with for such incidental matters as you have mentioned? That is what you have in mind, is it not?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. You have spent in this fiscal year, as I understand it, about \$7,000 for this purpose?

Maj. GARLINGTON. The \$7,000 was for the Rockport case. I do not know what the others will be yet.

Gen. COE. The cost at Pensacola was \$550.

Mr. SLEMP. It would be just for a few yards of trackage here and there. You have no contingent appropriation?

Gen. COE. No, sir; it has been entirely wiped out.

Maj. GARLINGTON. Last year you reduced our contingent fund estimate from \$100,000 to \$50,000. This is for contingencies arising in connection with the Engineer Department's operations covered elsewhere in this bill. Now, if the contingent fund could be made a little bit larger, or large enough to cover such things as Gen. Coe has just mentioned, that would afford means for meeting any unforeseen work of that kind.

Mr. SLEMP. You are asking \$50,000 for the contingent fund?

Maj. GARLINGTON. Yes, sir; we are asking \$50,000 this year, but if this language is not included, it seems to me that the \$50,000 should be somewhat increased.

Mr. SLEMP. As I remember, that was for some seawall proposition.

Maj. GARLINGTON. Yes, sir; and for storm damage and other work that might be almost completed at the end of the fiscal year when the funds might lapse, and we would want to finish the work. There is one point about this proposed language that I did not bring out very clearly, and that is that it is also intended to cover this matter of shelters which we are not able to take care of in that way under the existing language. The antiaircraft defense structures are relatively new things with us, and we did not formerly build them.

Mr. SLEMP. If you will remember your hearings two years ago, you stated then that you had 151 of these antiaircraft guns.

Gen. COE. We did; yes, sir. Those are the ones I referred to a moment ago.

Mr. SLEMP. They were not all on Government property?

Gen. COE. No, sir.

Mr. SLEMP. How many were and how many were not; or do you remember?

Gen. COE. As I recall, about 60 per cent of them were on military reservations and about 40 per cent were on privately owned property, but I may not be accurate about that.

Mr. SLEMP. That would leave about 60 to be installed.

Gen. COE. The shelters have no relation to these.

Maj. GARLINGTON. We have already built the others.

Mr. SLEMP. Out of other moneys?

Maj. GARLINGTON. Out of the appropriation for the construction of gun and mortar batteries.

Gen. COE. We commenced to move them right after the war.

Mr. SLEMP. Do you think of anything else on this proposition that you have not brought out?

Maj. GARLINGTON. I think everything has been placed before you. If I may be permitted, I would like to clear up the amount estimated to lapse under the gun and mortar battery construction. The amount estimated to lapse had not been prepared for submission to the committee, but from my knowledge of the situation I estimate that approximately \$300,000 will not be required.

Mr. SLEMP. Can you make a report on that subject at an early date?

Maj. GARLINGTON. I can, in time to send back with the proof of the hearings.

Mr. SLEMP. I will appreciate it if you will.

Maj. GARLINGTON. Very well.

NOTE.—At the end of the fiscal year 1921, under the appropriation for battery construction, it is estimated the sum of \$300,000 will revert.

LABOR AND MATERIAL COST.

Mr. FRENCH. Of the \$600,000 asked on the modified basis, approximately \$557,000 is estimated for the 16-inch and 12-inch emplacements. Have you divided that on the basis of labor and material?

Maj. DARLINGTON. Not in the data prepared for discussion before the committee.

Mr. FRENCH. In a general way, and from your experience, how would it run? What percentage would represent labor and what percentage material—fifty-fifty?

Maj. GARLINGTON. As a general rule on this construction work that is about the way it runs.

Mr. FRENCH. What kind of labor do you employ? The work is not done by contract, is it?

Maj. GARLINGTON. Nearly all of this work is done by hired labor.

Mr. FRENCH. And you do the directing of the work itself?

Maj. GARLINGTON. Exactly.

Mr. FRENCH. The estimates were made on the basis of the wages paid several months ago?

Maj. GARLINGTON. Yes, sir; the estimates were prepared last March, in time for submission to the Treasury Department in September.

Mr. FRENCH. Have you noticed any falling off in the wage scale as compared with the period when the estimates were made?

Maj. GARLINGTON. The Engineer Department has not yet been able to reduce its wages, and the depression has not been sufficient

to have that reaction with us. The wages which are being paid are still those on which these estimates were based.

Mr. FRENCH. The papers and magazines are constantly discussing the question of the readjustment of wages in manufacturing plants, and I notice that even the railroads are considering that question. It has occurred to me it is a question that will be immediately before the department by the time this money will be available, and it has further occurred to me that if the estimates were made on the basis of the wages paid several months ago or, as you say, in March of last year, that possibly we could take into consideration the question of prospective wages in arriving at the amounts necessary.

Maj. GARLINGTON. Yes, sir. I would like to say in that connection that in conducting our work the district engineers are not allowed to pay more than the prevailing labor rates. Of course, there may be a period of a few months when they may pay other rates, but that is only permissible until the rates are adjusted. But when the district engineers hire labor they have to pay the prevailing rates of the community. For instance, the district engineer in Norfolk must pay his labor, his foremen, and so on, the rates prevailing around Norfolk and Newport News, and the district engineer in Boston is only allowed to pay the prevailing rates in the vicinity of Boston. So if there is a reduction in wages next summer, when this money becomes available, automatically each district engineer will have to adjust his wage scale accordingly.

Mr. FRENCH. I would like to ask you about materials. Will you need to buy most of your materials or have you sufficient materials in stock?

Maj. GARLINGTON. No, sir; most of the materials have to be bought; the sand, gravel, cement, and lumber, which are our main materials, have to be bought from time to time in the locality of the work.

Mr. FRENCH. Were the costs of materials based upon the prices last March?

Maj. GARLINGTON. Yes, sir.

Mr. FRENCH. Has there been a dropping off in the cost of materials during the last nine months?

Maj. GARLINGTON. I think there has been a slight drop, but just how much that amounts to I am not prepared to say. Materials of that kind do not reflect changes in market prices as quickly as some other things, like dry goods, groceries, and things of that kind.

Mr. FRENCH. In the hearings before the naval subcommittee we found that the cost of lumber and materials in the way of food products had fallen very markedly, in some instances 30 per cent and in some instances 50 per cent, in comparison with a year ago, and it occurred to me that here might be a reasonable place to make an inquiry as to whether or not there was that falling off. Again, if there should be a falling off in these materials, it would necessarily be reflected by the time this money would be available.

Maj. GARLINGTON. In that connection, though, it should be borne in mind that that would only affect those items where we expect to complete. We have already cut down this estimate to such an extent that in most cases we will have just enough money to carry on the work as indicated. However, having reduced this amount to \$600,000 an attempt to apply to it a reduction in wages or materials

might make what we are asking for go a little further; that is, the \$600,000 might go a little further.

Mr. SLEMP. You do not work under the contract system? The Engineers employ their own men?

Maj. GARLINGTON. In this work very little contract work is done, although in some cases small structures are erected under contract. But the battery work is entirely done by hired labor under our own supervision.

Mr. SLEMP. In fixing the rates of pay, you say you follow the prevailing rates for similar work in the locality where the work is being done?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. How are those rates determined?

Maj. GARLINGTON. They are determined by the district engineers, who make inquiries into wages paid in their localities. In some of those localities during the war period, you know, there were labor boards appointed which announced the wage scales.

Mr. SLEMP. They have all been abolished, have they not?

Maj. GARLINGTON. I think most of those boards have been abolished. In submitting his pay rolls—which come in every month for audit in Washington—a district engineer must certify as to his day labor, foremen, and men of that class, that the scales he is paying are those prevailing in the locality, so that he is held to those scales, with the exception of the period required for him to determine the proper wage scales. That regulation, of course, is to prevent the Government from competing with the local industries and contractors, and they very quickly protest if they find the Government is paying more than they can pay.

MODERNIZING OLDER EMPLACEMENTS.

Mr. SLEMP. The next item is modernizing older emplacements. You had \$37,250 for the present fiscal year and you are asking \$112,653 for next year. Tell us about your expenditures this year and then what you plan to do next year.

Maj. GARLINGTON. I think the statement of most value to you will be the sums allotted and the purposes for which allotted. At Portland, Me., for widening platforms, \$121.88; extending field of fire, battery Berry, \$2,100; new floor in battery Chase, \$1,500. At Portsmouth, N. H., widening platforms, \$8,000; installing ammunition hoists, \$2,483.12. At Boston, widening shot hoists, \$100. Fort Wright and Fort Michie, ammunition trolley tracks, \$1,800.

Mr. SLEMP. Would those trolley tracks come under the same classification you mentioned a while ago?

Maj. GARLINGTON. This is in connection with the ammunition service; it is in connection with installing those modified shot hoists. Delaware River, battery Torbert, rearranging ammunition trolley tracks, \$1,497. Potomac River, Fort Washington, widening projectile hoists, \$772.91. Charleston, S. C., ammunition delivery table, \$200; projectile-handling devices, \$1,500. Key West, widening platforms, \$2,900. Mobile, widening platforms, \$7,600.

Mr. SLEMP. Does that complete the work at Mobile?

Maj. GARLINGTON. That will complete it; yes, sir.

Mr. SLEMP. Will the work at Portsmouth be completed?

Maj. GARLINGTON. Yes, sir; because I think we may say that we are not going to ask next year for any more widening of platforms, so that these allotments will take care of these batteries, complete the work at those localities, and wind them up. San Francisco, clearing field of fire, Battery Mendel, \$75, and for procuring equipment in connection with the modification of ammunition-handling devices, \$1,450. That makes the total allotted the end of December, \$32,099.91, and leaving an unallotted balance on that date of \$5,150.09, which it is proposed to allot to take care of other items of the same character at various places.

WIDENING PLATFORMS.

Mr. SLEMP. You stated in the hearings last year that you wanted something like \$130,000 for widening platforms. Have you suddenly abandoned the idea of using money for that purpose?

Maj. GARLINGTON. In answering that question, sir, I would like to say that as I understand the present attitude of the Artillery which uses these batteries, they feel that in view of the necessity for retrenchment in expenditures that this work can best be left undone of the various things that should be done.

Mr. SLEMP. It is not considered as absolutely vital or absolutely necessary for firing a gun to have the platforms widened.

Maj. GARLINGTON. This is for the purpose of enabling the guns to be loaded most efficiently and with the least loss of time.

Mr. SLEMP. You might load a gun more quickly, but you can load it under present conditions?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. How does it happen that after you have just completed your platforms it is necessary to widen them? Why did not the Engineers provide for that originally?

Maj. GARLINGTON. It is because those batteries were built 15 or 20 years ago; that is, the batteries on which this work is being done, and since that time the projectiles have been modified; they are longer and heavier, and they require more men to ram them into the gun; that means a longer rammer staff and a ramming crew of several more men, and they require that much more room. Those batteries were built so that the firing platform was about 12 feet above the ground, and the men on the end of the rammer could not get hold until they had started to ram; they had to grab hold as it was moving, and it is a very inefficient arrangement.

Mr. SLEMP. How much has the length of the projectile increased by reason of modern development?

Maj. GARLINGTON. I suppose it is a matter of inches; I do not know exactly.

Mr. SLEMP. That is what I thought; but these widened platforms are usually made 6 feet.

Maj. GARLINGTON. That was for the purpose of handling several more men; I do not remember whether they required two or four more men, but it is to handle several more men, in order to enable them to get hold of the rammer staff.

Mr. SLEMP. I rather thought that the increased length of the projectile and the increased weight of the projectile really should

have been anticipated by the Engineers and a margin allowed when the platforms were built.

Maj. GARLINGTON. These are batteries built, as I say, generally speaking, 15 or 20 years ago, and if there was a failure to anticipate this need at that time——

DETAILS OF ESTIMATES.

Mr. SLEMP (interposing). What is the purpose for which you intend to use the \$112,653 next year?

Maj. GARLINGTON. Of that estimate the Chief of Coast Artillery and ourselves are willing to drop all the items except those having to do with altering the ammunition handling devices, completing the widening of the ammunition hoists, and lighting the platforms at Fort Pickens, which come within the reduced figure of \$13,900.

Mr. FRENCH. Your total, then, is \$13,900?

Maj. GARLINGTON. Yes.

Mr. SLEMP. What will be the distribution of the \$13,900?

Maj. GARLINGTON. The distribution of the \$13,900 is as follows: Modernizing the lighting system at Battery Worth at Fort Pickens, on the gun platform, \$616; altering the trolley projectile handling devices at Battery Arnold; Fort Mott, Battery Harker, Fort Delaware, and Battery Sevier, Fort Pickens, \$2,072; a guard, to insure correct pointing of projectile, at Puget Sound, \$1,800; connecting trolley rails, Battery Benson, \$900; extending trolley rails, Batteries Moore and Worth, Puget Sound, \$1,000; a total for modernizing trolleys and projectile-handling devices of \$5,772; completing the widening of 10-inch hoists at Portsmouth, N. H., \$4,550, and at Galveston, \$2,900, a total for widening 10-inch hoists of \$7,450.

Mr. SLEMP. Can these batteries be operated as they are to-day without the expenditure of any of this money?

Maj. GARLINGTON. They probably could be without that lighting which is only \$616, but the other ammunition service is necessary in order for these batteries to function at all.

Mr. SLEMP. Take the widening of those hoists for example: You have been firing those guns all along without that expenditure, have you not?

Maj. GARLINGTON. No, sir; not since this new ammunition was provided. You see, they were fired with the old type of projectile all right, but since the new type of projectile was adopted they have not been able to use them and will not be able to do so until we complete this work.

Mr. SLEMP. Are all of the batteries along the coast in that same condition?

Maj. GARLINGTON. No, sir. This should complete that work. Am I right in that answer, Maj. Ruhlen?

Maj. RUHLEN. I think you are.

Maj. GARLINGTON. As I gather from the data here the money asked for next year will complete that work.

Mr. SLEMP. Is that statement true with reference to all of our batteries, 6-inch, 10-inch, 12-inch, etc.; that is, that you do not propose to spend any more money on account of the adoption of this new ammunition?

Maj. GARLINGTON. This is a statement prepared on that subject:

Under appropriations prior to 1917 all 12-inch Taylor-Raymond projectile hoists in the United States and insular possessions have been altered to accommodate the long-pointed projectiles, and all existing 12-inch Hodges hoists have been replaced by modern 12-inch Taylor-Raymond projectile hoists. All 10-inch hoists on the Pacific coast and in the insular possessions, also all in the defenses of Chesapeake Bay and Long Island Sound, have been altered.

With funds appropriated February 14, 1917, work was commenced on the remodeling of all remaining 10-inch Taylor-Raymond projectile hoists, and the replacement by 10-inch Taylor-Raymond projectile hoists of all existing 10-inch Hodges hoists. This work was interrupted by the removal of armament from certain 10-inch batteries for shipment abroad, but is now progressing at such batteries as are to remain in service. An estimate of \$10,550 to provide for the completion of the work has been included in the estimates submitted for the fiscal year 1922.

That is what is not clear; that says \$10,550, while the amount I gave shows reductions to something over \$7,000.

Mr. SLEMP. Under this item for modernizing older emplacements, if you do not enlarge the platforms and do not spend any more money on the hoisting apparatus, along what other lines would you spend the money?

Maj. GARLINGTON. There was an item for increasing the fire of Battery Kinzie, Puget Sound, which involved the cutting away of the side of a hill.

Mr. SLEMP. That was done last year?

Maj. GARLINGTON. It was asked for last year, but not appropriated for.

Mr. SLEMP. You did not get enough money to take care of that?

Maj. GARLINGTON. No, sir.

REEMPLACEMENT OF GUNS SENT TO FRANCE.

Mr. SLEMP. Have the guns which were taken to France been replaced in the seacoast artillery service?

Maj. GARLINGTON. I do not think any of them have been sent back for reinstalling.

Maj. RUHLEN. Practically all that it is intended to reemplace have been remounted.

Mr. SLEMP. Will you put a note in the record showing what has been done in that connection and the substitutes, if any, that have been supplied? I have understood that you were going to substitute railway artillery at many places for the guns that were taken to France.

Status of seacoast armament removed for use of A. E. F.

Caliber.	Re- moved.	Re- mounted.	Not to be re- mounted.
3-inch guns.....	6	6	.....
4.7-inch guns.....	8	8	.....
5-inch guns.....	34	4	30
6-inch guns.....	97	20	77
8-inch guns.....	56	5	51
10-inch guns.....	70	37	33
12-inch guns.....	14	.....	14
12-inch mortars.....	100	.....	100

Maj. GARLINGTON. That is, if the system of using seacoast defense guns is adopted.

DEFENSES AT KEY WEST.

Mr. FRENCH. One of the items eliminated is of interest to me and I would like to ask a question about it. What have you at Key West in the way of a plant?

Maj. GARLINGTON. You mean the armament at Key West?

Mr. FRENCH. Yes; what have you there now?

Maj. RUHLEN. We have 3-inch, 6-inch, 10-inch, and 12-inch guns, and 12-inch mortars.

Mr. FRENCH. Upon whose recommendation is a battery placed? For instance, upon whose recommendation was Key West determined upon as a place for such a battery?

Maj. GARLINGTON. I think at the time the batteries were installed it was almost entirely a function of the Engineers. A little later, whenever an important station was selected for fortifications, a board of officers was appointed, which included artillerymen and engineers. Their reports came to the War Department and the Board of Review, which included the heads of the Artillery Service, the Engineers, and other general officers on duty in the War Department, went over those projects. Now, these projects are initiated by the corps area department commanding generals with their staffs, which include artillerymen and engineers, and are submitted to the War Department, where the War Plans Divisions goes over them, calling on the Chief of Artillery for his comments, the Chief of Engineers for his comments, and the Chief of Ordnance for his comments.

Mr. FRENCH. Would you be in a position to indicate to the committee just what is the purpose of this particular battery, what it is supposed to protect or accomplish?

Maj. GARLINGTON. Not without refreshing my memory and getting out the chart of that locality. Personally, I am not familiar with Key West.

Gen. COE. I might say that the existing defenses of the country were first proposed by what is known as the Endicott Board, convened in 1885, and then the next general board on that subject was the Taft Board, which was convened in 1906, I think, and the Taft project has practically been completed. It represents the existing defenses as they stand to-day; that is, with the exception of the 12-inch long-range batteries. That was an afterthought, perhaps, of what was known as the Board of Review. They put in 31 local batteries of 12-inch guns which were surplus guns on hand with a new type of carriage, which gave them their full range, which is 27,000 yards instead of 15,000 yards. That brings the defenses up to the 16-inch gun which we are now trying to install. The defenses of Key West, which is the particular question, were designed to prevent the seizure of Key West for use as a base of operations by a hostile enemy's force and to preserve it for the use of our Navy in case they desired it in any operations in the Caribbean or Gulf. There is a naval station there.

Mr. FRENCH. There is a submarine base there?

General COE. There is under construction a large submarine base. There has been a naval station there for a great many years.

Mr. FRENCH. It seemed to me so far removed from any considerable population or cities and so inaccessible that I was interested in having developed just why it was necessary to have a battery at that particular point.

ABANDONMENT OF DEFENSES.

Mr. SLEMP. I should like to ask right along that line whether your department has made a study in any way of the abandonment of any of the coast artillery posts in view of the possibilities of railway artillery?

Gen. COE. Yes, sir; we have under consideration continually the question of the possibility of abandoning posts. We have recommended the abandonment of certain interior posts. For instance, the defenses at Baltimore; we have abandoned those with the exception of two forts where we have left a few guns and placed them in the hands of a caretaker, our belief being that there is a very remote possibility of their ever being brought into use in case of war. I might go through the whole list that is under consideration.

Mr. SLEMP. Have you abandoned any since the armistice?

Gen. COE. Yes, sir. Fort Carroll and Fort Howard—we have abandoned all the forts in Baltimore Harbor as coast artillery stations. Fort Howard has been turned over to the corps area commander as the commander's headquarters. His headquarters were in Baltimore.

Mr. SLEMP. Are those the only forts which you have abandoned?

Gen. COE. We have made certain recommendations as to the abandonment of some others. We have abandoned Forts St. Jackson and St. Phillips on the Mississippi River, and have dismantled them. We have also recommended the abandonment of Fort Baldwin in Maine.

Mr. SLEMP. Have any forts along the Potomac River between Washington and the mouth of the river been abandoned?

Gen. COE. There are Forts Washington and Hunt, about 14 miles below Washington.

Mr. SLEMP. They have not been abandoned?

Gen. COE. No, sir; there will be a small garrison there.

Mr. SLEMP. They are not needed?

Gen. COE. No, sir; I do not think they are of vital importance for fortifications, but there have been expenditures there that have caused us to leave a small garrison, not fully manned, and there is, perhaps, some sentimental value attached to them.

Mr. SLEMP. You have had a number of additional batteries thrown on the Coast Artillery organization, have you not, in the last few years?

Gen. COE. Yes, sir.

COAST ARTILLERY PERSONNEL.

Mr. SLEMP. The reorganization act of 1920 requires you to have about 30,000 men?

Gen. COE. Thirty thousand men.

Mr. SLEMP. Have you those now?

Gen. COE. We have about 23,000, actually.

Mr. SLEMP. As against how many?

Gen. COE. Out of a total authorized under the bill of 30,000.

Mr. SLEMP. And a prewar strength of thirteen or fourteen thousand?

Gen. COE. Of 20,000.

Mr. SLEMP. Has your normal enlisted strength been about 20,000?

Gen. COE. Yes, sir. The Coast Artillery Corps was increased to 30,000 by the act of June, 1916.

Mr. SLEMP. And you have about 23,000 now?

Gen. COE. About 23,000; yes, sir.

Mr. SLEMP. Does that fairly man the different posts?

Gen. COE. I do not think that the Coast Artillery Corps should be reduced below 30,000. It takes 10,000 for the insular possessions, which is nearly full battery strength. We maintain the Coast Artillery in the Philippines and Hawaii at about battery strength, and at Panama at slightly below.

Mr. SLEMP. You think that the minimum number of men for the Coast Artillery at those three places should be 10,000 out of your total?

Gen. COE. Yes, sir.

Mr. SLEMP. That is, the existing batteries?

Gen. COE. Yes, sir. That leaves 20,000 men for the remaining activities to which the Coast Artillery is assigned. That is, the handling of fixed armament in the coast defenses, the handling of antiaircraft artillery, and the handling and development of heavy tractors, railroad equipment, and so forth. Under the 30,000 we assign 9,000 to railroad and heavy tractor artillery, 11,000 to fixed armament of the coast defenses, 4,500 men to the antiaircraft batteries in the coast defenses. To man the existing railway artillery that we have takes about 18,000 men. We assigned to the development and work with the existing railroad artillery—that is, the railroad artillery that we had on our hands at the end of the war—only about 3,600 men. That is a brigade of four regiments, peace strength. The remainder, about 5,400 men, we assigned to the two heavy tractor batteries, based one on the west coast, at Camp Lewis, Puget Sound, and one on the east coast in South Carolina.

Mr. SLEMP. But you have the same guns as the Field Artillery has?

Gen. COE. Yes, sir; just the same.

Mr. SLEMP. While not within the province of this committee, have you given any consideration to the interchangeability of the Field Artillery and the Coast Artillery service.

Gen. COE. I think they come right together. There is really no dividing line between the 16-inch gun—

Mr. SLEMP (interposing). I have been told that to maintain the esprit d'corps of the separate organizations in some way and to meet the psychology of the situation it is necessary to keep a Field Artillery organization and a Coast Artillery organization, but as a matter of fact the guns are interchangeable for seacoast purposes or for artillery purposes?

Gen. COE. Between the 14-inch gun and the 75-mm. gun there is no place that I know of where you could draw the line. Both are mobile methods of fire. Of course, they differ from one end of the scale to the other, but you can not take any point and say on this side it is this way and on the other side it is a different way. When you

get to the 16-inch gun you come to the point where you have absolute immobility.

Mr. SLEMP. You had mobility when the war came?

Gen. COE. Yes, sir.

Mr. SLEMP. And the men in your service, the Coast Artillery, you trained immediately to the use of the guns?

Gen. COE. Yes, sir. I was speaking of after the war itself rather than the training.

Mr. SLEMP. A man who can shoot a 16-inch at a movable target would have no trouble using the field artillery guns?

Gen. COE. No, sir. Of course, a company of men trained to fire a 16-inch gun is not competent to handle guns for which they have not been trained.

Mr. SLEMP. It is just a matter of training?

Gen. COE. The methods of fire are the same.

WEDNESDAY, FEBRUARY 9, 1921.

FOR PROTECTION, PRESERVATION, AND REPAIR OF FORTIFICATIONS.

Mr. SLEMP. "For protection, preservation, and repair of fortifications for which there may be no special appropriation available," you had an appropriation of \$300,000 last year and you are asking \$300,000 for next year. Why do you substitute the words "submarine mine" for "torpedo"?

Maj. GARLINGTON. Because the term "torpedo" has been dropped in our military terminology to define these submarine mines—they are designated as "submarine mine structures" and "mine casemates," and so forth, and it seems better to have the language of the appropriation in the ordinary language used to describe them.

Maj. RUHLEN. May I add, Mr. Chairman, that the technical definition of a torpedo is a mobile device. The Coast Artillery use only the fixed anchored devices, which are called mines, and to make the language probably more up to date we suggest that change.

Mr. SLEMP. As a matter of fact, the torpedoes are a naval project rather than under the jurisdiction of the Coast Artillery?

Maj. GARLINGTON. Yes, sir; exactly, except that experiments are being made with the radio controlled Hammond torpedo. These are conducted under the Artillery.

Mr. SLEMP. Have you anything to report on that experiment?

Maj. GARLINGTON. No, sir.

Maj. RUHLEN. Gen. Coe will have something to say later.

Mr. SLEMP. How did you expend the money last year, and what is the balance?

Maj. GARLINGTON. The financial statements prepared are as of the 1st of January. On that date there was unallotted \$9,610.50. Allotments have taken place since that time, and there is no question but that all of the money will be expended by the end of the year.

Mr. SLEMP. You generally divide these expenditures into two classes—nonstructural and general maintenance and structural repairs?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. What amount did you expend this year under those two classifications, respectively?

Maj. GARLINGTON. The itemized statement which I have shows that difference, but it has not been totaled in that way. The allotments to December 31, 1920, are: Structural, \$95,389.50; and non-structural, \$195,000.

Mr. SLEMP. Please give a general description of the kind of work you perform under this appropriation, and where, without going into too much detail.

Maj. GARLINGTON. The work done under this appropriation which is known as nonstructural preservation and repair is for the incidental upkeep of the batteries that can not be done by the troops and the purchase of necessary material to enable the troops to keep them in condition. It involves the repair of damage after firing the batteries, such as the breakage of windows and doors, furnishes the lumber on which the projectiles are stacked; it repairs wash and erosion of the sand slopes and repairs to drainage systems when they get out of order. Then the class of repairs referred to as structural repairs covers work of repair to a particular structure which has been reported on during the year and an estimate submitted for its repair. When, due to the general age and deterioration of structures needing repair, the district engineer submits his estimate, and when the money is available it is allotted for that specific structure. That is the reason we refer to them as structural repairs. If I should read a few of these items, it might aid you. Portland, Me., repair of approach to wharf.

Mr. SLEMP. Is that structural?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. How much?

Maj. GARLINGTON. \$1,000. Replacing the stacks of central power plant at Fort Levett, \$400; waterproofing brick walls of fire-control stations, \$350. I will skip down. Repairs and leaks at Fort Getty—that means where the water gets down into the magazines through the concrete, through cracks or otherwise, which have to be repaired.

Mr. SLEMP. That would be nonstructural?

Maj. GARLINGTON. That would be structural in the sense that it was submitted as a definite item for that battery. If you see what I mean, our use of the word "structural" means that an estimate is submitted for specific work and "nonstructural" is for general maintenance, for unforeseen——

Mr. SLEMP (interposing). I rather thought the distinction was that any change in type or in the character of the protection that involved an essential change in the structure would be a structural change, and that any leakage or breakage in the walls or in the side slopes would come under the general head of repair and maintenance, and that the doors which you put in last year was a substitution of one kind of a door for another and therefore that would be a structural repair?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. If one of the doors was broken and you wanted to repair it, I would call that a repair or maintenance item. That is the way I have been visualizing your division.

Maj. GARLINGTON. That is correct.

Mr. SLEMP. You have not any clear line of division?

Maj. GARLINGTON. The way that the estimates come in to us we have, because where work of repair is needed at a given locality for a specific item, we list that as a structural repair, and then we provide in this appropriation a sufficient amount to take care of ordinary incidental maintenance items that come up during the year.

Mr. SLEMP. Did you spend any money during the past year on the repair and maintenance of the 12-inch batteries?

Maj. GARLINGTON. No, sir; there does not seem to have been any expenditure for any specific item at any batteries. There may have been some expenditure under general maintenance.

Mr. SLEMP. Does that apply also to the 12-inch mortars?

Maj. GARLINGTON. No, sir. There are allotments to various older batteries, some of which are 12-inch mortar batteries.

Mr. SLEMP. Most of this money is expended on the 6-inch batteries?

Maj. GARLINGTON. No, sir. I think that this is spread over all the items of fortification structures in such a way that it would be difficult to say on which ones it was used more than any others.

Mr. SLEMP. This is what is in my mind. The 6-inch batteries and the 10-inch batteries are generally regarded as obsolescent, if not obsolete, and you have not expended much money on the 12-inch batteries, either guns or mortars.

Maj. GARLINGTON. I see what you mean.

Mr. SLEMP. We are spending about \$300,000 a year, really throwing it away, on these obsolescent or obsolete batteries.

Maj. GARLINGTON. We are attempting to keep in condition all the batteries at which guns are still mounted.

Mr. SLEMP. Please put in the record a statement as to how much you spent this year on the 6-inch batteries, how much on the 10-inch batteries, how much on the 12-inch guns, and how much on the 12-inch mortars.

Maj. GARLINGTON. Yes, sir. On batteries below 12-inch caliber, \$15,990; batteries 12-inch and above, \$19,770.

PROPOSED EXPENDITURES.

Mr. SLEMP. Taking up your proposed expenditures for the coming year of \$300,000, you have divided that into \$168,750 for non-structural and general maintenance, and \$131,250 for structural repairs?

Maj. GARLINGTON. The way the estimates for the nonstructural, preservation, and repairs or general maintenance are handled is as follows: The corps area and department commanders send to the Chief of Engineers their estimates for what is required within their corps areas or departments. The idea of that is to make them responsible for the general condition of all military utilities within their jurisdiction. For the fiscal year 1922 they aggregated from the four departments in the United States in which there are coast defenses, \$304,760. In going over these amounts in the office of the Chief of Engineers it was realized that it was necessary to reduce that amount, and in going over the details of those estimates they were all rejected except the ones for which there seemed to be a good explanation supported by sufficient evidence to make us know that it was really needed, which resulted in a reduction to \$168,750, which is the amount submitted to Congress.

Mr. SLEMP. That is for the nonstructural?

Maj. GARLINGTON. Yes, sir; the general upkeep.

Mr. SLEMP. Now, as to the structural repairs?

Maj. GARLINGTON. That is based on a long list of items that has been submitted direct to the Chief of Engineers from the district engineers where they itemized the condition of each of the structures needing repair. That long list came in from all over the United States and totals \$445,135.18. The Chief of Engineers' office in going over those estimates threw out all but \$131,250, and that is the estimate submitted to Congress. The great difficulty in this appropriation in deciding what estimate to submit to Congress is that the funds allotted have not kept up with the work. The condition of the batteries and structures is that a great many of them are in need of repair for which no money is available and our long list of estimates shows that a great many items have not been taken care of, but it is realized that the funds must be kept within reason. It is also realized that the local authorities want to have everything at their localities in "apple pie" order and that the main idea for them is to cover every possible little thing.

Mr. SLEMP. You have discounted their estimates as a rule on an average 50 per cent, perhaps a little more?

Maj. GARLINGTON. The list of items of structural repairs—i. e. specific structures needing repairs—totaled \$445,000, and that has been reduced to \$131,000, to almost, say, 25 per cent.

Mr. SLEMP. About 33½ per cent.

Maj. GARLINGTON. Yes, sir. An inspection of these figures would indicate that we have made an honest effort to keep the appropriation within reason.

Mr. SLEMP. This appropriation would have nothing to do with the upkeep of roads in the posts?

Maj. GARLINGTON. No, sir; the Quartermaster Corps does that.

Mr. SLEMP. Or the buildings at the posts?

Maj. GARLINGTON. None of the buildings other than structures connected with the batteries and the fire control.

Mr. SLEMP. And the power houses?

Maj. GARLINGTON. The power houses are also included under this appropriation.

Mr. SLEMP. This has nothing to do with fire-control cables or fire-control stations or the plotting rooms?

Maj. GARLINGTON. For preservation and repair it does; yes, sir.

Mr. SLEMP. How much are you spending on that?

Maj. GARLINGTON. That is relatively a small amount. It is just for taking care of such things as leaking roofs or broken windows in the stations.

Mr. SLEMP. What is the character of work that is to be done on the batteries themselves with the \$300,000 which is estimated? Please give a number of sample items?

Maj. GARLINGTON. On the batteries themselves?

Mr. SLEMP. Yes; that is what most of this estimate is for?

Maj. GARLINGTON. Yes, sir; mostly.

Mr. SLEMP. Would you say 90 per cent would be expended on the guns, carriages, and emplacements?

Maj. GARLINGTON. The guns and carriages are not taken care of from this appropriation; that pertains to the Ordnance Department. This would be the emplacements themselves.

Mr. SLEMP. Would it be 90 per cent?

Maj. GARLINGTON. I do not think it would be more than 67 per cent, or two-thirds. The batteries, of course, are a much more permanent type of structure and they would not need as much repairing as the other auxiliary structures, which are in many cases frame structures.

Mr. SLEMP. What are they?

Maj. GARLINGTON. These are some of the estimates: Repairs to wharf at Fort Gorges and repairs to wharf at Fort McKinley, \$1,500 each. Concrete trough for repairing submarine cable in the coast defenses of Boston, \$850. Repairing underground electric system at Fort Adams, \$2,500. Improving surface drainage in rear of Battery Hale—that is, of course, a battery item—\$1,250. Dredging lower end of submarine mine-planting wharf, \$2,100 at Fort Dupont. Repairing fire control and time interval systems at Fort Monroe, \$300. Miscellaneous repairs to submarine-mine structures at Fort Monroe, \$800. Repairs to three mine stations at Fort Dade, Tampa, \$2,730.

Mr. SLEMP. You have not yet named an item which is essential to the efficiency of any battery. The submarine-mine proposition I would regard as certainly temporarily useless.

Maj. GARLINGTON. Mr. Chairman, in answering your question I am looking through the whole list of items, which total \$445,000, and attempting to cover——

Mr. SLEMP (interposing). I am willing for you to subdivide your request into that which is essential to the efficient handling of the batteries and call that class A, and that which is useful, but not vital——

Maj. GARLINGTON. I see what you mean. The list here is a detailed list of the larger sum, which, as I say, we reduced to \$131,250, and that is our class A.

Mr. SLEMP. If you will take your guns and their carriages, roads, buildings, and grounds, and say there is nothing for the 12-inch guns or mortars used in this, I would not pay much attention to the balance.

Maj. GARLINGTON. I could read you under this item everything having to do with batteries, the total being \$131,000.

Mr. SLEMP. Just give me some examples. You have given me some, but I did not think they were good.

Maj. GARLINGTON. You asked me to give some that did not have to do with the batteries.

Mr. SLEMP. I want you to give me some that have to do with them, some that are useful.

Maj. GARLINGTON. You want to get this under structural repairs?

Mr. SLEMP. Yes.

Maj. GARLINGTON. Portland, Me., repairing earth cover, \$750.

Mr. SLEMP. What kind of a battery is that?

Maj. GARLINGTON. It does not give the battery here. Steel doors, batteries, Honeycutt, Weymouth, Acker, and Bowdoin, \$2,100. Repairs to concrete walls, Battery Ingalls, \$500. Emplacement lights, Battery Terrell, Fort Standish, \$300. Repairs to under-

ground electric systems at Fort Greble, \$875. Replacement of the controls for the ammunition hoists at Batteries Howse and Dickinson, \$400. That is in Narragansett Bay.

Mr. SLEMP. And the others are of a similar nature?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. You would not regard the \$168,750, nonstructural and general maintenance, as worth very much, would you?

Maj. GARLINGTON. You mean, as going very far?

Mr. SLEMP. I mean of any use at all. Could not a lot of it be done by soldiers who are around the batteries, enlisted men?

Maj. GARLINGTON. Well, as much of the work as can be done is done by the troops that occupy the defenses, but there is always a certain amount that requires the provision of material, and this appropriation is available for that.

Mr. SLEMP. How much of it do you usually spend on material?

Maj. GARLINGTON. I suppose about 50 per cent.

Mr. SLEMP. You do not propose to spend much money on submarine mine defense, wharves, etc., do you?

Maj. GARLINGTON. A good deal of it goes into the repair of those buildings, as those buildings being of the lighter type of construction, such as submarine mine storehouses, cable tanks, etc.

Mr. SLEMP. How far out does the Coast Artillery take jurisdiction of the submarine mine matter?

Maj. GARLINGTON. They have jurisdiction over all the fixed mines; that is, the anchored mines; the floating mines are planted by the Navy. As far as the distance goes, it is generally at the entrance to the harbors that the fixed mines are placed.

PREPARATIONS OF PLANS FOR FORTIFICATIONS AND OTHER WORKS OF DEFENSE.

Mr. SLEMP. The next item is for preparation of plans for fortifications and other works of defense, \$25,000, and that is what you had last year.

Maj. GARLINGTON. Yes, sir; that has been, you might say, the standard amount, including 1917, 1918, the fiscal year 1920, and the fiscal year 1921. This amount is intended to be applied toward the expenses of district engineers in connection with the preparation of plans for new fortification construction, and for which construction funds are not available, and for the land defenses of fortified harbors in the United States, under instructions of department commanders. In addition, funds are required to cover the cost of studies for the defense of the borders and others of mobile artillery in connection with coast defenses, which studies are now in progress under the immediate supervision of division engineers, and for the collection and dissemination of data relating to the carrying capacities and clearance of railroads.

Mr. SLEMP. How many men have you employed under this appropriation?

Maj. GARLINGTON. This is allotted to the various districts and pays the expenses of draftsmen and surveyors when they are on work of this character.

Mr. SLEMP. Would not the preparation of plans for defenses at any particular point be the joint action of the engineers and the Chief of Coast Artillery?

Maj. GARLINGTON. The preparation of the plans, that is, the strategical plan or the tactical plan, as the case might be, would be the function of the higher War Department officials, but the actual preparation of the plans, like drafting, blue printing, and the necessary field work, would be a function of the Engineers. These are plans in that sense, the detailed drawing work.

Mr. SLEMP. Do you employ civilians under this item?

Maj. GARLINGTON. This item is used entirely to defray the expenses of civilians.

Mr. SLEMP. To what extent?

Maj. GARLINGTON. It is the share of the regular engineer district organization expenses prorated to work of this character, work which his force is doing. Each district engineer has an office organization and a field organization which he uses to do this fortification work as it is assigned to him, and if his surveying party spends three days in collecting data the salaries of the men for those three days are paid out of this appropriation.

Mr. SLEMP. Then these are really incidental expenses?

Maj. GARLINGTON. Yes, sir; connected with the preparation of plans and designs on which estimates are based to submit to Congress.

Mr. SLEMP. I rather had the idea that there was a board, I believe, located in New York, studying this defense proposition, and that this \$25,000 was for the purpose of meeting the expenses of that board.

Maj. GARLINGTON. Your impression on that is correct. The Board of Engineers which formerly sat in New York did go over the fortification problems and plans as they were submitted, and they had a force whose expenses were met out of this money. In former years a large part of it was spent right there.

Mr. SLEMP. That board has been abolished?

Maj. GARLINGTON. That board has been abolished within the last year, and some of that work is done in the office of the Chief of Engineers here and the remainder is done out in the district offices.

Mr. SLEMP. And pending a real knowledge as to what the expenditures are going to be in the respective corps areas in this regard you think it best to keep this appropriation for the coming year for the purpose of testing it out?

Maj. GARLINGTON. It seems necessary to have this amount available for that, particularly in view of the fact that a number of projects for 16-inch armament are under consideration and will require investigation.

Mr. SLEMP. Was money used out of this appropriation during the last fiscal year for determining the character of the emplacement to be used?

Maj. GARLINGTON. Some of it, yes.

Mr. SLEMP. Just how was the money allotted last year?

Maj. GARLINGTON. It was allotted as follows: To Portland, Me., \$500; Providence, R. I., \$1,000; to New York, \$2,000. A part of the expenditure at New York was for the purpose of permitting the district engineer to draw up the preliminary plans for the application of the dispersed system of magazines to the Fort Tilden project. To Philadelphia, \$1,000; Baltimore, \$500; Norfolk, \$2,000. Norfolk

is another case where the work involved the adaptation of that scheme to the Fort Story project. Charleston, S. C., \$250; Jacksonville, Fla., \$500; Montgomery, Ala., \$1,000; Galveston, \$500; Los Angeles, \$220.14; San Francisco, \$6,000; Portland, \$1,000, and to the Board of Engineers, \$7,000. That totals \$23,470.14.

Mr. SLEMP. The allotment of \$7,000 to the Board of Engineers for this year will not be repeated during the next fiscal year?

Maj. GARLAND. No, sir.

Mr. SLEMP. How do you propose to distribute the \$25,000 this coming year?

Maj. GARLAND. The exact distribution is not worked out, but the amount of work in the past has justified us in believing that that amount of money will be needed for work of that character during the year, and it is not thought wise to reduce it.

MAINTENANCE AND REPAIR OF SEARCHLIGHTS AND ELECTRIC LIGHT AND POWER EQUIPMENT FOR SEACOAST FORTIFICATIONS.

Mr. SLEMP. The next item is for maintenance and repair of searchlights and electric light and power equipment for seacoast fortifications, and for tools, electrical and other supplies, and appliances to be used in their operation, including the purchase of reserve lights. You had \$60,000 this past year. What are your balances?

Maj. GARLINGTON. There was unallotted on December 31, 1920, \$11,000.64; of course, allotments have been made since that time, and are being made, to cover the purchase of the material and supplies needed by the Coast Artillery, largely in the operation of the 25-kilowatt power sets that are installed in the various batteries.

Mr. SLEMP. How many of those are there?

Maj. GARLINGTON. There are 219 in the continental United States.

Mr. SLEMP. Those kilowatt sets perform other services than the operation of searchlights, do they not?

Maj. GARLINGTON. Yes, sir; they furnish the light for all the batteries and they furnish the power needed on the larger caliber guns for traversing the gun, and in the case of the disappearing carriage for pulling the gun back during drill.

Mr. SLEMP. How much of the \$60,000 this year was spent on the kilowatt sets, and how much on the actual repair of searchlights?

Maj. GARLINGTON. Practically all of this appropriation was expended in the upkeep, maintenance, and supplying of the spare parts for the 25-kilowatt sets, and the proportion that was used for the spare parts for the searchlights and carbons was the smaller part of the appropriation.

Mr. SLEMP. Practically all of the \$60,000 was used for the power plants?

Maj. GARLINGTON. By far the larger portion; yes, sir.

Mr. SLEMP. I think it will be well to separate that, inasmuch as the language refers to searchlights and electric-power equipment.

Maj. GARLINGTON. I think we can go through the requisitions that have come in and segregate the searchlight upkeep from the power-plant upkeep at a number of the defenses and then take that as an average.

Mr. SLEMP. When I said searchlights I meant the portion irrespective of the power, since these kilowatt sets are used for so many other purposes.

Maj. GARLINGTON. Yes; I understand; aside from the upkeep of the lights themselves.

NOTE.—The requisitions for the first six months of the fiscal year indicate that the supplies for searchlights will run about 33 per cent and the supplies for the power plants, etc., will run about 67 per cent of the total.

Mr. SLEMP. Did you use any of the money for what you call tools, electrical and other supplies during the present fiscal year?

Maj. GARLINGTON. Yes, sir. The "other supplies" are the real meat of this appropriation; they are small parts like spark plugs, valves, valve stems, and all that sort of thing.

Mr. SLEMP. The reason I asked you about that was that you have estimated \$245,000 for oils and lubricants for generating equipment for this coming fiscal year, which does not seem to have been in any previous estimate or in any previous appropriation.

Maj. GARLINGTON. In the past those things have been furnished by the Quartermaster Corps; the gasoline and the oil, except the cylinder oil, were furnished by the Quartermaster Corps out of their general Army appropriations.

Mr. SLEMP. Why did they drop that practice this year?

Maj. GARLINGTON. It was determined that the estimates could be prepared much more closely by having the various bureaus of the War Department that were responsible for various installations prepare the estimates and submit them, and then the money would be spent by the supply bureau charged with the purchase of those supplies.

Mr. SLEMP. You are asking for the next fiscal year \$305,000, which is divided into ordinary supplies, \$60,000—

Maj. GARLINGTON (interposing). That is the kind of thing we have been talking about and used last year.

Mr. SLEMP. And additional for oils and lubricants for generating equipment, and for maintenance of portable searchlight outfits, \$245,000. This is an increase over the amount you had last year of \$245,000. It seems to be a new estimate so far as this item is concerned, not having been carried in any previous appropriation or made in any previous estimate.

Maj. GARLINGTON. The reason for that is the new system of submitting estimates which went into effect in compliance with the following instructions from The Adjutant General of the Army, dated August 4, 1920:

1. Estimates for all requirements of the War Department for the fiscal year 1922 will be prepared and submitted direct to the Chief of Finance for the activities in your charge on or before September 15, 1920.

2. In the preparation of the estimates for the support of the Army, the following instructions will be observed: The estimates submitted by each service should cover the requirements for all supplies and equipment pertaining to that service. Where under the provisions of law, regulations, or specific instructions procurement of such supplies is to be made by another service, the proper adjustment of funds will be made after the appropriation has been secured.

Mr. SLEMP. How much did you use for oils and lubricants for that generating equipment and how much did you use for portable searchlight outfits during this fiscal year?

Maj. GARLINGTON. The furnishing of those was not under the Engineer Department.

Mr. SLEMP. I know; but do you know how much it was?

Maj. GARLINGTON. I have not that data. Our estimates for next year is based on the data obtained from reports on the actual operation of these searchlights for a given period, which is tabulated in our office and an average taken.

Mr. SLEMP. How much do you propose spending on the maintenance of portable searchlight outfits this coming fiscal year?

Maj. GARLINGTON. The amount submitted under that heading is, for the oil and gasoline for 58 mobile searchlights, \$46,400; the amount of supplies coming under the head of miscellaneous repair parts, furnished under that \$60,000, is not itemized.

Mr. SLEMP. How many mobile searchlights have you in actual operation?

Maj. GARLINGTON. Fifty-eight is the number of searchlights that are on hand, but I will have to verify that and submit it. What I mean by that is that 58 is larger than the number actually installed.

Mr. SLEMP. We have the hearings on the Army bill before us, and I call your attention to this item of the Quartermaster General: It is item No. 1205.104 under "Regular supplies," for—

fuel in kind for cooking and heating offices, barracks, quarters, storehouses, recruiting stations, and other buildings when authorized; for operating of lighting plants and modern batteries.

Under this item he had \$4,755,922. That was apportioned for this fiscal year, and the estimate for 1922, on the basis of 175,000 men, for the same item was \$13,517,000. In the next item he estimates for gasoline and lubricants in addition \$742,080.

Maj. GARLINGTON. But his estimates there are for an increased army, and in making them he dropped the seacoast defenses that he had the year before.

Mr. SLEMP. This estimate is for 175,000 men. That is what I read you there.

Maj. GARLINGTON. The matter of the coordination of these estimates, of course, is wholly in the office of the Chief of Finance, and we have submitted these estimates in compliance with the letter that I read. I feel sure that there is no duplication, because the Director of Finance's office is charged with that duty.

Col. SMITH. Mr. Chairman, I think the estimate that you read relating to lubricants and gasoline pertains to the requirements for the mobile artillery and for the Tank Corps. I believe that the hearing will show that, and that it is not gasoline for the requirements of the Engineers.

Maj. BROWNE. In the allocation to engine supplies for modern batteries, lighting plants, and ice plants, the estimate in this bill is \$9,000, which is manifestly not sufficient.

Mr. SLEMP. That was carried in the Army bill as it passed the House?

Maj. BROWNE. Yes, sir.

Mr. SLEMP. I can not imagine how you would need to spend so much money on the operation of portable searchlights. You do not run them very much, do you?

Maj. GARLINGTON. While the need for funds for that purpose, of course, can only be estimated roughly, due to the fact that they have not been distributed among the coast defenses until this last year, we will probably require this amount. As I stated a moment ago, the

consumption of gasoline by them has not been separated by the Quartermaster General from other gasoline used, so that this was arrived at by fixing the arbitrary figure of \$800 per portable light, and there are 58 of those mobile lights to be provided for. As I say, it was worked out as an arbitrary figure.

Col. SMITH. On page 577 of the hearings on the Army bill you will see that the item of \$742,080 pertains to gasoline and lubricants for the operation of tanks and tractors.

Mr. SLEMP. Your estimate is for oils and lubricants, and not for gas.

Maj. GARLINGTON. Gasoline is an oil.

Mr. SLEMP. Is that what you mean?

Maj. GARLINGTON. I think undoubtedly it would be covered by that.

Mr. SLEMP. Will you state how many gallons of gas you want to use, and for what purpose?

Maj. GARLINGTON. The estimate as submitted is figured on 3,000 gallons of gasoline each for 219 25-kilowatt sets, at 28½ cents, \$187,245; 29 gallons of oil each for 219 25-kilowatt sets, at 75 cents, \$9,500; oil and gasoline for 58 mobile searchlights, at \$800, \$46,400, making a total of \$238,408.25. The estimate for contingencies is \$6,591.75, and the total estimate is \$245,000.

Mr. SLEMP. How many of those 219 kilowatt sets are constantly or daily in operation?

Maj. GARLINGTON. A very small proportion are in daily operation. During certain periods of the year they are in daily operation, i. e., during the drill season of the artillery. During the remainder of the year only a very small proportion are constantly operated every day, but they are all operated every week to keep them in good condition. See page 134.

Mr. SLEMP. How many of them constitute the exclusive means by which power and light can be furnished to the facilities of the post, other than the batteries?

Maj. RUHLEN. Seven 25-kilowatt sets in two plants at two forts.

Mr. SLEMP. Were those kilowatt sets put in during the war as an additional means of securing power, and are they, therefore, supplementary to the power already put in those batteries?

Maj. GARLINGTON. In a number of cases, that is true. There have been central power plants which supplied power to the various batteries, and the 25-kilowatt sets were put in to enable the battery to operate its lights, etc., when the central plants were put out of action.

Mr. SLEMP. Is that the case as to 90 per cent or 95 per cent of the kilowatt sets—that is, that they are simply supplementary?

Maj. GARLINGTON. That is largely true in the case of the older batteries. I would say that about 75 per cent of the total are possibly what we call reserve power sets, but in the newer batteries they furnish the main reliance for power for the batteries. They are now installed right in the battery itself, and in the newer 12-inch long range batteries they are the only source of power.

Mr. SLEMP. What proportion of your gas is to be used for this 25 per cent that you refer to, and what proportion of the gas, or what percentage, is to be used for the reserve power that you mention?

Maj. GARLINGTON. This would have to be allocated in accordance with the use at the various posts, and this estimate is only based on the average or actual amount used during a given six months, i. e., six months in 1918, when 213 sets were reported on, and we have used

that figure on the consumption of oil and gasoline over that period as the basis for this estimate.

Mr. SLEMP. That was a period of war activities, when you were keeping these sets running constantly. That was an exaggerated period, and it should not be regarded as normal.

Maj. GARLINGTON. That is why the reduction that I have mentioned was made by the Chief of Coast Artillery. He informed the Chief of Engineers that the running could be reduced so as to only need the reduced amount of money. That reduced figure will cut down the allotment to the point to which we were directed to reduce it.

Mr. SLEMP. You made a reduction from \$305,000 to \$288,000, which was a reduction of only \$17,000. That is not a substantial reduction.

Maj. GARLINGTON. This reduction in the consumption of oil and gasoline was from \$245,000 to \$228,356.

Mr. SLEMP. Disregarding your experience in 1918, please put in the record a statement showing the consumption of gas at these different plants during the fiscal year 1921.

Maj. GARLINGTON. We will call upon the Quartermaster General for that information, and if his expenditures for gasoline for seacoast batteries are kept separate from the other gasoline issues it can be furnished.

Mr. FRENCH. Your records would show what you have called upon him for, would they not?

Maj. GARLINGTON. Not for gasoline. The requisitions for gasoline are made direct to the local quartermaster and do not come up through the Engineers. They have not been included in the Engineers' estimates in the past.

Mr. FRENCH. As this is a new item, it seems that we should have some measuring stick.

Mr. SLEMP. At what price did you estimate your gas?

Maj. GARLINGTON. At 28½ cents.

Mr. SLEMP. Just how did you arrive at that—from the Quartermaster General?

Maj. GARLINGTON. I assume that that was obtained from the Quartermaster General.

Mr. SLEMP. It is a better figure than he gave himself before the committee. I do not think it is low enough, but I think it is a better figure than he gave.

Is any of this money supposed to go to any power plants other than these kilowatt sets?

Maj. GARLINGTON. If there are any special power plants with steam-driven units supplying power to batteries, yes, sir. That is true, because at certain posts there are central power plants where there are some steam-driven units used to supply power to the batteries, and the supplies and upkeep for them would come from this appropriation.

Mr. SLEMP. How could you separate that from the power necessary to light the post, run the laundry, ice plants, etc.?

Maj. GARLINGTON. By keeping records of the current consumption by the batteries and charging the proportion.

Mr. SLEMP. That would be a very small percentage of this money, however, would it not?

Maj. GARLINGTON. Yes, sir; a very small percentage. Nearly all of it is for the 25-kilowatt sets.

Mr. SLEMP. Seventy-five per cent of your kilowatt sets constitute a reserve, do they not?

Maj. GARLINGTON. I think that is approximately correct. Mr. Chairman, may I make this statement on the basis of something which has just been called to my attention by Maj. Ruhlen? I overlooked the fact that there are 78 searchlights in actual operation, each of which require a 25-kilowatt set and which can not be classed as reserve. Col. Ruhlin has called my attention to this fact, and it is our opinion that not more than 50 per cent can be classed as reserve. Therefore, it is deemed advisable for me to actually canvass the situation in this respect and submit a statement regarding it for the record when it comes back. My answers have been offhand answers and should be corrected.

Mr. SLEMP. Can you state how much gas is required to operate one of those 78 searchlights per year?

Maj. RUHLIN. Based on four hours' operation per week for the year, which is considered reasonable for peace time conditions, the gasoline requirements would be 1,775 gallons.

NOTE.—Of the 219 25-kilowatt sets for which lubricating oil and gasoline must be purchased, 78 are in use with searchlights and are the primary and sole sources of power for such lights.

Of the remaining 141 25-kilowatt sets about 20 per cent are reserves. In addition, other sources of power are available for the batteries. Central power plants (usually steam-actuated generating sets) are maintained by the Quartermaster Corps at a number of posts. Commercial current is also available at some seacoast fortifications.

Mr. SLEMP. In other words, get this upon a constructive basis. You have put it upon the basis of the consumption of gas during a period in 1918, or a period of war activity?

Maj. GARLINGTON. Yes, sir.

CONSTRUCTION OF MINING CASEMATES, CABLE GALLERIES, ETC., FOR SUBMARINE MINES IN THE UNITED STATES.

Mr. SLEMP. The next item is:

For construction of mining casemates, cable galleries, submarine mine storehouses, cable tanks, and other structures necessary for the operation, preservation, and care of submarine mines and their accessories, and for providing channels for access to submarine mine wharves.

Maj. GARLINGTON. The estimate submitted is \$55,000.

Mr. SLEMP. You had under this item \$150,000 last year. What is the state of your balance?

Maj. GARLINGTON. There was allotted to December 31, 1920, \$66,390, and unallotted \$83,610.

Mr. SLEMP. You do not expect to spend that \$150,000 during this fiscal year, do you?

FORT STORY MINE PROJECT.

Maj. GARLINGTON. I have a statement to make covering the situation at Fort Story which would answer that question as to the expenditure of the balance remaining of the \$150,000.

Mr. SLEMP. Suppose you go right into it. Last year you started out by asking \$860,000, and then withdrew all of that except an amount for a wharf, as I remember it, down at Fort Story.

Maj. GARLINGTON. It was not quite that. We withdrew all of what was submitted under the Fort Story item except \$100,000, or a total of some \$693,000, last year. We reduced that amount to \$100,000. Then, there were some other items at other places that you appropriated for. I have a statement prepared here which I will read:

As indicated at the hearings last year, the original plans for the submarine mine structures at Cape Henry were dropped, and studies were made of the practicability of providing the necessary facilities at Fort Monroe. Those studies indicated that the cost at that place would range anywhere from \$184,000 to \$300,000, depending upon the exact scheme adopted, any of which would have the disadvantage of curtailing the further development of the artillery school facilities in that locality. The possibility of getting the necessary space and making the needful alterations in the existing structures at the Army supply base at Norfolk, Va., has recently been investigated. The plan proposed as a result of that preliminary investigation was not satisfactory to the Chief of Coast Artillery, and the matter has been referred back to the district engineer and the commanding officer of the Coast Artillery training center at Fort Monroe. It is hoped that a definite plan can be decided upon during the current fiscal year in time to permit of the necessary work of adaptation of the existing facilities to be at least started with current funds. The present estimate is retained so as to provide for the completion of the project in the next fiscal year.

That is to say, this balance of \$83,000, we hope, will enable us to alter some of the buildings at the Norfolk supply base in such a way that they can be used to store this material and provide the other facilities, and this money is being held for that purpose now, or so much of it as may be needed, but due to the hold-up in the decision on this plan, there is an item in next year's estimate of \$52,000 for that purpose.

Mr. SLEMP. You mean that is a reappropriation?

Maj. GARLINGTON. It will amount to that. If we could spend a part of this \$83,000, and begin in time, we would not need this \$52,000 next year.

Mr. SLEMP. You would return the \$83,000 to the Treasury at the end of this fiscal year, and we would reappropriate \$52,000?

Maj. GARLINGTON. That would be approximately it. That was the balance on December 31, but there may have been small allotments made since.

Mr. SLEMP. The situation down there, as I understand it, is that you have buildings at Fort Monroe in which you have stored cables, buoys, and other submarine mine material, and you have at the seacoast defense, boats that takes this material out for practice. You also feel that you could utilize this space for such other submarine activities as you wish to have in the vicinity of Fort Story?

Maj. GARLINGTON. It is not quite that, but instead of building new structures at Fort Story, we could go to Fort Monroe, and it was thought that we could use certain of the temporary buildings that were constructed there during the war and some of the existing structures so as to provide the necessary space. When we went into the thing we found that the buildings down there were not suitable and could not be converted at a reasonable expense, and that to provide facilities at Fort Monroe would cost at least \$184,000. As it had been stated to the committee that a very small expense would be incurred in doing it, those plans were rejected as being out of the question. We then turned to the supply base at Norfolk.

Mr. SLEMP. If that \$83,000 is returned to the Treasury and no money is appropriated this year, you would still have cables, buoys,

etc., in storage at Fort Monroe that would be sufficient to mine the entrance to Chesapeake Bay?

Maj. RUHLEN. No, sir; we have not.

Maj. GARLINGTON. There is a different number of mines in the different mine fields. At Fort Monroe there is a smaller mine field than at the entrance.

Mr. SLEMP. You need it at the entrance?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. You need it at the entrance or across the channel from Fort Story to Cape Charles or from Cape Henry to Cape Charles. The theory was to store this material there and to operate it from Fort Story?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. You would operate the mines from Fort Story?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. So that this matter might well be delayed until you still further perfect the defense at Fort Story, except in a temporary way.

Maj. GARLINGTON. Would it not rather be of the utmost advantage to have that mine defense prepared now so that there would be some measure of defense pending the building of the batteries?

Mr. SLEMP. You are not asking now for money for buildings for operation purposes at Fort Story?

Maj. GARLINGTON. The building has already been completed out of the 1920 funds.

Mr. SLEMP. What you do ask for is storage facilities and loading facilities which are now in existence at Fort Monroe to be transferred over to this Army and Navy base. Suppose we just say to the people at Fort Monroe, "You must keep this for another year"?

Maj. GARLINGTON. I want to make clear that the facilities at Fort Monroe, are entirely occupied by the material for the Fort Monroe mine field.

Mr. SLEMP. What is the Fort Monroe mine field as distinguished from the mine field across the mouth of the channel?

Maj. GARLINGTON. The mine field at the entrance to the Chesapeake Bay would be the first and outer line of defense to close the entire bay, and the existing Fort Monroe mine field for the secondary line of protection to the entrance to Hampton Roads, which is so valuable to the Navy. It has therefore been considered necessary to have both lines. In other words, there has been no proposal to eliminate the Fort Monroe mine field. We are trying to provide both facilities for the Fort Story mine fields in addition to the existing facilities at Fort Monroe. \$52,000 is for the mine defense project at Fort Story and \$3,000 for moving mine equipment at Fort Michie, from its present location to this 16-inch emplacement. That figure of \$55,000 before the committee has been reduced to \$50,000.

Mr. SLEMP. If no money is appropriated under this item, but this language is carried, find out what effect that will have on our defense situation in the Fort Story-Hampton Roads area with special reference to Fort Monroe?

Maj. GARLINGTON. In connection with the questions you have just asked?

Mr. SLEMP. Yes, sir. In the bill of last year you eliminated this?

Maj. GARLINGTON. Yes, sir. There is no estimate for "sites" this year and no estimate for "land defenses" this year.

INSTALLATION AND REPLACEMENT OF ELECTRIC LIGHT AND POWER PLANTS AND PURCHASE AND INSTALLATION OF SEARCHLIGHTS AT SEACOAST DEFENSES IN THE UNITED STATES.

Mr. SLEMP. The next item is: "For the installation and replacement of electric light and power plants at seacoast fortifications in the United States; the purchase and installation of searchlights for seacoast defenses in the United States," etc. You had \$566,250 last year and are asking for \$368,755 this year. What are your balances under the appropriation for last year?

Maj. GARLINGTON. As before, on December 31 the total allotments were \$435,148.53, leaving unallotted \$131,101.47.

Mr. SLEMP. Will you spend or allot that amount during the remainder of the fiscal year?

Maj. GARLINGTON. A canvas of the needs of the remainder of the fiscal year indicates that it will all be spent, except between \$20,000 and \$30,000, probably.

Mr. SLEMP. That is, all allotted and unallotted money?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. How did you spend that appropriation, first, for purchase and installation of searchlights, and installation and replacement of electric light and power plants at seacoast fortifications in the United States?

Maj. GARLINGTON. I will give you the total allotments to December 31 for the two items which you have called for: Purchase and installation of searchlights, \$285,780; electrical installations, \$149,368.53.

Mr. SLEMP. As a matter of fact, you do not use searchlights on antiaircraft defenses, because you have not got any?

Maj. GARLINGTON. No; not to any extent.

Mr. SLEMP. How many are there?

Maj. GARLINGTON. Antiaircraft guns?

Mr. SLEMP. Searchlights for the antiaircraft defenses.

Maj. GARLINGTON. I do not think there have been any installed specifically for that purpose yet. The portable units are used in that connection and can be available also for the other.

Mr. SLEMP. Please give us a brief statement of your searchlight situation at the defenses, including the portable searchlights, installed of each class for the present year, the success of your experiments with the new type of portable searchlights with the towers that you speak of, and what work has been done along these lines during this fiscal year.

Maj. GARLINGTON. I have had prepared a table showing the total number of lights of each class which it is intended to install in the coast defenses of the United States, and which also shows the number which has been furnished and installed.

Mr. SLEMP. And the type of each?

Maj. GARLINGTON. Yes, sir. I will insert that in the record.

Searchlights and electrical installations—Status of projects and equipment.

Type.	Project requires.	Furnished.	To be furnished.	Type.	Project requires.	Furnished.	To be furnished.
Towers:				Portables:			
Wood.....	26	26	.....	Cadillac.....	48	149	.....
Fixed steel.....	5	3	2	Tractor.....	24	.....	24
Dis. steel.....	19	.....	19	Totals:			
Other fixed types:				Fixed.....	104	78	26
Vertical lift....	9	5	4	Portable.....	72	149	24
Other types....	45	44	1				

¹ 1 surplus.

Maj. GARLINGTON. As to the experiments on the tractor type of light with the tower, of which considerable was said in the hearings last year, I will make a brief statement now.

Two contracts were entered into with separate concerns for building two different types of tower. One was placed with the Edward F. Terry Co. for a 60-foot extensible tower. This is practically completed and has been assembled and tested, but it was found that the locking device on it fails to unlock. It has been redesigned, and it is expected that it will be completed within the month of February. The other order was placed with the Charles H. Clark Co. When the tower was constructed, it was found to be nearly 100 per cent heavier than the weight specified by the office of the Chief of Engineers on the general plans on which the contractor was working, so that the whole lower section of the tower had to be omitted, making the tower much shorter. Lighter outriggers were substituted, and in every way possible reductions in the weight were made so the tower can be carried on the tractor. These modifications have been made, and the tower and its hoisting mechanism assembled on the tractor, and the electric apparatus necessary to operate it is to be installed probably during this month and the whole unit tested.

Both of these towers are to be mounted on caterpillar tractors of the Christie type, built by the Front Drive Motor Co. The Clark tower was tried out on a tractor at Hoboken, N. J., and, as stated, was found to be much too heavy. They have had to alter it. So the net result is that we have two of these units which are almost ready for delivery to the artillery for test.

Mr. SLEMP. What has been the cost?

Maj. GARLINGTON. The total money spent for these two under these contracts has been \$146,000; the two tractors cost \$95,000, the Terry tower, \$21,000, and the Clark tower \$30,000. That, of course, is a development cost.

Mr. SLEMP. I think that bears out just what we contended last year?

Maj. GARLINGTON. Yes, sir. That is to say, when you told us that the appropriation of money to buy a large number of towers was inadvisable until the experiments were carried out.

Mr. SLEMP. We were told by the engineers that the difficulties had all been met and that Congress could safely appropriate the money, or some of it.

Maj. GARLINGTON. The designs of the towers were completed at that time and we were optimistic about their satisfactoriness, but the actual development was disappointing in that the difficulties were not overcome for just about a year.

Mr. SLEMP. If I understand, we have searchlights by which we can operate every single gun in continental United States and along the coast?

Maj. GARLINGTON. No, sir. I do not think it can be said that we have sufficient lights installed to illuminate the targets for all the guns installed. We have nearly all the searchlights mounted that we have had a project for, but those projects have been kept at less than the actual requirements would be for fighting all the batteries at one time because of the tremendous cost. We have practically completed what is considered to be the minimum searchlight installation that we can get along with.

Mr. SLEMP. What is the difference between the minimum searchlight program and the war searchlight program?

Maj. GARLINGTON. It would be difficult to answer that question exactly, but the furnishing of lights sufficient to take care of the parts of the harbors that are the most dangerous would be considered the minimum requirement, and enough lights so that every battery could be brought into play in an illuminated area would be the war requirement.

Mr. SLEMP. You have practically completed the minimum now?

Maj. GARLINGTON. Yes, sir. For next year the revised figure is \$100,000 for this whole appropriation, of which the smaller amount only is for the searchlights.

Mr. SLEMP. For next year you asked originally for \$368,755, but in trying to bring the bill down to the \$15,000,000 basis, or about that, you have reduced this item to \$100,000?

Maj. GARLINGTON. Yes, sir.

ALLOTMENT OF APPROPRIATION.

Mr. SLEMP. The items composing the \$100,000 are what?

Maj. GARLINGTON. As stated at the beginning of the hearings, the data prepared are on the larger figure, which I can give you the details of, and then we would have to allocate the smaller figure to the best advantage among those items after it was appropriated.

Mr. SLEMP. You can do that for the record.

Maj. GARLINGTON. Showing how we would expend the \$100,000?

Mr. SLEMP. That is what we would consider.

Maj. GARLINGTON. I can do that now, because I have been over this and annotated it. I will read the way in which the \$100,000 would be distributed.

Mr. SLEMP. That is right.

Maj. GARLINGTON. Portland, Me., construction of shelter for 60-inch Cadillac unit, Cape Elizabeth, \$2,045; Jewells Island, installation of 60-inch searchlight on disappearing steel tower and powerhouse for same, \$12,955.

Mr. SLEMP. What is your equipment there now?

Maj. GARLINGTON. The 12-inch battery at Fort Levett, which will be completed this year.

Mr. SLEMP. Without this installation that battery would have no searchlight?

Maj. GARLINGTON. It would have no searchlight.

Boston, substituting a modern vertical lift installation for the existing 36-inch light at Fort Revere, \$9,750.

Mr. SLEMP. Substituting a 60-inch light?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. What type of battery is that?

Maj. GARLINGTON. Twelve-inch. Also supplying a 6-inch light on the same type of vertical lift for the 36-inch light at Fort Andrews, \$8,265.

Mr. SLEMP. What caliber of gun is that?

Maj. RUHLEN. Twelve-inch mortars.

Maj. GARLINGTON. The installation of a 60-inch light on Deer Island, on a vertical lift.

Maj. RUHLEN. Ten-inch guns.

Maj. GARLINGTON. Providence, R. I., completion of electric installation now in progress in the defenses of New Bedford and Narragansett Bay, \$5,000; southern New York, \$4,000.

Mr. SLEMP. What is that battery?

Maj. GARLINGTON. That is searchlight No. 11.

Maj. RUHLEN. A mine light.

Maj. GARLINGTON. To illuminate a mine field.

Mr. SLEMP. Have you any there now for that purpose?

Maj. RUHLEN. A 36-inch light of obsolete type.

Mr. SLEMP. You have in stock the 60-inch lights?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. This is simply the installation?

Maj. GARLINGTON. The installation of the lights and in some cases the power houses and power cables.

Mr. SLEMP. And they cost anywhere from \$2,000 to \$9,000 apparently?

Maj. GARLINGTON. It varies a great deal with the location and type of mount.

Delaware, electric installation at Forts Dupont and Mott, \$3,000.

Maj. RUHLEN. They are 12-inch guns and 12-inch mortars.

Maj. GARLINGTON. Completion of searchlight installation for the defense of the Delaware, \$3,000; the same guns you have just given.

Maj. RUHLEN. The same and the additional arm for the whole defense.

Maj. GARLINGTON. Charleston, completion of searchlight installation in the defenses of Charleston, \$5,500.

Mr. SLEMP. What is the use of that?

Maj. RUHLEN. That is to apply to searchlight facilities for the batteries and defenses of Charleston.

Mr. SLEMP. At what place?

Maj. RUHLEN. Charleston.

Mr. SLEMP. Fort Moultrie?

Maj. RUHLEN. Fort Moultrie and Fort Sumter.

Mr. SLEMP. What have you there now?

Maj. RUHLEN. Three-inch, 6-inch, 10-inch, and 12-inch guns and 12-inch mortars.

Mr. SLEMP. What have you in the way of searchlights?

Maj. RUHLEN. We have 30-inch and 60-inch searchlights.

Mr. SLEMP. One of each?

Maj. RUHLEN. Yes, sir.

Maj. GARLINGTON. This is to put in some 60-inch lights on steel towers. The steel towers have already been contracted for, but will probably not be delivered until too late to get them in this year.

Mr. SLEMP. Are these searchlights ever used for commercial purposes, to locate vessels in the harbor and give them the channel on dark nights?

Maj. GARLINGTON. I do not believe they are used for that purpose.

Maj. RUHLEN. They are not permitted to throw searchlights on commercial vessels.

Maj. GARLINGTON. Pensacola, completion of searchlight installation, \$2,000, power installation for batteries Cullum and Sevier.

Maj. RUHLEN. That is a 10-inch battery.

Mr. SLEMP. All that you are putting in are 60-inch, in every case?

Maj. GARLINGTON. Yes, sir. As you will notice, a part of this is power installation.

Mr. SLEMP. When you speak of power installation you mean you are putting in another kilowatt set?

Maj. GARLINGTON. Generally that, or going over the lighting systems and putting in modern lighting systems where they are worn out.

Mr. SLEMP. You are not asking for any money for searchlights on tractors?

Maj. GARLINGTON. No, sir. We are now waiting until we find out whether we have something that will work.

Mr. SLEMP. That is, on the self-propelled mount?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. Are you asking any money for portable searchlights drawn by tractors, for example, or by any other means?

Maj. GARLINGTON. Not for next year; no, sir. There is one item which, perhaps, it might be well to talk about now, sir, and that is that a part of this estimate is for the rehabilitation of searchlight equipment.

Mr. SLEMP. How much do you ask for that?

Maj. GARLINGTON. About \$15,000.

Mr. SLEMP. At the end of the next fiscal year you would say that every battery along the coast would be able to fire at night, being well equipped with searchlights?

Maj. GARLINGTON. I would prefer to express that in this way: That every coast defense along the coast of the United States would be reasonably well equipped with searchlights, which would enable them to illuminate the most critical areas, but not that every battery would be so supplied.

Mr. SLEMP. Do you have any searchlights along with your railway artillery guns?

Maj. GARLINGTON. We have issued a few mobile lights, that is to say, 60-inch lights mounted on Mack trucks for experimentation with the railway artillery.

Mr. SLEMP. That would be the only possible use of mobile searchlights, would it not?

Maj. GARLINGTON. With the railway artillery?

Mr. SLEMP. Yes.

Maj. GARLINGTON. No, sir; we have sent out into the coast defenses about 48 Cadillac mobile searchlights to enable them to be

used at various points in the coast defenses, so as to avoid the necessity of building three or four fixed towers, and also 10 additional for use of antiaircraft detachments.

Mr. SLEMP. They would be sent to these corps areas and kept in a general supply center?

Maj. GARLINGTON. No, sir; they have been sent out into the coast defenses and they form a part of each coast defense. That is what we are working on in connection with tractor searchlights, so as to give the artillery mobile lights for coast-defense purposes rather than having them anchored down.

Mr. SLEMP. You have them now, but not self-propelled, have you not?

Maj. GARLINGTON. I do not quite understand the question.

Mr. SLEMP. You have plenty of tractors with which you could draw a mounted searchlight anywhere you wanted to place it?

Maj. GARLINGTON. Yes. But what I refer to is a self-contained unit, consisting of a tractor with a tower and searchlight mounted on it.

Mr. SLEMP. That is a self-propelled mount of the Christie type?

Maj. GARLINGTON. Yes, sir. I want to say about that rehabilitation item, that that is to take care of going over the searchlight material which was accumulated during the war and put in storage at the engineer depot at Schenectady, N. Y. You will remember that in the hearings last year considerable was said about the availability of equipment as a result of the World War, and a so-called searchlight rehabilitation section was organized for the purpose of going over all that material and putting it in shape for issue, and it is from that place that all the lights that were installed during the last year were sent out into the defenses.

RESERVE EQUIPMENT.

Mr. SLEMP. Have you a considerable reserve of that equipment?

Maj. GARLINGTON. The searchlight material that has been purchased is approximately \$7,500,000.

Mr. SLEMP. That you have on hand, you mean?

Maj. GARLINGTON. That has been purchased altogether, and most of which is on hand. A considerable portion of this material has either been in use or in storage, meaning both in the United States and in France, much of it in open storage, so that it must be overhauled, either for permanent storage or reissue. Since June, 1920, nine expert mechanics and electricians in the employ of the Chief of Engineer's Office have been stationed at the Army reserve depot, South Schenectady, N. Y., engaged in the rehabilitation of this material.

The records show that approximately \$1,290,450 worth of material has been overhauled at a cost to this office, in salaries, of \$11,614.41. The work, therefore, has been done at a cost of approximately 1.1 per cent of the cost of the material. A considerable quantity of the material was new and required only inspection, greasing, and some painting, but most of the Cadillac searchlight units that had been in service required very thorough overhauling. As the ordinary commercial charge for merely handling material of this kind, when taking it in for overhauling, is 10 per cent, it is felt that the unit maintained by this office has operated very efficiently and at a large

saving to the Government, and it is to keep that going over the remaining material on hand that the \$15,000 is included.

Mr. SLEMP. Did you get any 60-inch searchlights out of the matériel that you brought back?

Maj. GARLINGTON. Yes; all of the 60-inch lights that were installed last year, either in substitution for 36-inch lights or original installation, were handled from those lights.

Mr. SLEMP. Can you give some conception of the supplies on hand, searchlight supplies, which would be available for use in our seacoast defenses?

Maj. GARLINGTON. Yes; but I have not that data with me.

Mr. SLEMP. A good portion of that which you speak of as being at Schenectady was prepared for the field service, was it not?

Maj. GARLINGTON. Not a very large proportion of it, because the 60-inch lights, except those on the Cadillac unit, are for the coast defenses, and the Cadillacs were not issued to the mobile Army. They are available for use with the mobile Army, but they have not been issued as a part of the equipment.

Mr. SLEMP. Have your experiments led you to believe that your searchlights for field artillery could be mutually interchangeable and used with seacoast artillery or similar types of guns?

Maj. GARLINGTON. Yes. The mobile 60-inch light is suitable either for coast-defense work or for mobile Army work, except that for coast-defense work, in the majority of locations, it is necessary to have a certain elevation above the water to get a sufficient range, and that is why so many of the lights in the coast defenses are mounted on towers. This Cadillac unit has no tower on it; it is light enough to operate with the mobile Army and can also be used in the coast defenses, but it is just limited by that fact, of having insufficient height.

Mr. SLEMP. How many Cadillac mounts have you?

Maj. GARLINGTON. There are 85 of those lights either in the depot or in the coast defenses last year.

Mr. SLEMP. Were they all 60-inch lights?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. That is quite a protection in the way of producing additional searchlights.

Maj. GARLINGTON. We consider those 60-inch Cadillac units a very valuable type.

Mr. SLEMP. If you spend \$15,000 will you uncover more searchlights next year?

Maj. GARLINGTON. No, sir; the number of those lights is known now.

Mr. SLEMP. Will you be able to get from your field artillery searchlight supplies a lot of useful searchlights?

Maj. GARLINGTON. Well, we will be able to put in shape for issue, when needed, a large number of completed lights and their spare parts; we will be able to clean them up and repack them so that they will be available for issue when called for.

Mr. SLEMP. Will they also be 60-inch lights?

Maj. GARLINGTON. Yes, sir; that is the only size light that we are working with now.

Mr. SLEMP. You have a smaller light in the Army, did you not?

Maj. GARLINGTON. At one time; but the mobile light now, even for mobile Army use, would be the Cadillac unit, which mounts the 60-inch light.

Mr. FRENCH. I was wondering whether you are asking anything here, or elsewhere in the bill, that would be used for building additional towers for searchlights?

Maj. GARLINGTON. Yes, sir; this installation includes the building of the towers. None of that which is being asked for, however, is for the tractor type with tower.

Mr. FRENCH. How long does it take to throw up your tower and to install the searchlight?

Maj. GARLINGTON. The fixed towers can be built in a matter of two or three months, sometimes a little less; the tower which rotates like a bascule bridge, which we call the disappearing tower—and of which we have seven under contract now—requires for its installation a somewhat longer time; I should say about six months.

Mr. FRENCH. What is the difference in cost for completing a tower without installing a searchlight and completing a tower with its searchlight?

Maj. GARLINGTON. Due to the fact that we already have searchlights, the difference in cost would only be a few hundred dollars, and not more than \$1,000, for putting a searchlight on top of a tower.

Mr. FRENCH. Because you have the material on hand?

Maj. GARLINGTON. Yes, sir; but to the above figure must be added the cost of providing power for the light, which will run from \$2,000 to \$4,000, and the cost of controller cable, which varies within wide limits, depending on the distance involved.

Mr. FRENCH. With these searchlights as a nucleus, would it not be a ready proposition to throw up a temporary tower, if necessary, of even steel or timber? Could not such a tower be built in a very short time, say, in days even, or weeks?

Maj. GARLINGTON. That is true; yes, sir.

AMOUNTS TURNED BACK INTO THE TREASURY.

Mr. FRENCH. I have been noticing the amounts of money that we have appropriated under this item since 1917. In 1917 we appropriated \$1,700,000; in the next year \$110,000; in 1920 we did not make any appropriation, but in 1921 we appropriated more than a half million dollars, a total of approximately \$2,000,000, in comparison with annual appropriations from 1914 of \$50,000 a year. Are not our searchlight arrangements and our protection along the coast infinitely better than they could have been prior to 1917?

Maj. GARLINGTON. Yes, sir; they are; we are in better shape with regard to searchlights than we ever have been before.

Mr. SLEMP. How much did we turn back to the Treasury last year out of the money previously appropriated?

Mr. FRENCH. Nothing is indicated here, but maybe we did.

Maj. GARLINGTON. Yes, sir; there was something turned back.

Maj. RUHLEN. \$1,250,000 under the act of March 3, 1919, was withdrawn.

Mr. FRENCH. At any rate, since 1917 we have put into this kind of work probably more than \$1,000,000.

Maj. GARLINGTON. Yes, sir.

Mr. FRENCH. Including the amounts appropriated, from which we subtract the amounts turned back?

Maj. GARLINGTON. Yes, sir.

Mr. FRENCH. As I understand, since 1917, through direct appropriations for this item and through appropriations made in consolidated items, something like \$8,400,000 was made available for this class of work.

Maj. GARLINGTON. That is correct, except that this amount covered electric light and power equipment and sound-ranging equipment, as well as searchlights.

Mr. FRENCH. Then I further understand that we turned back at the end of the war \$2,260,000.

Maj. GARLINGTON. It is even more than that. I have a summary here which shows that we turned back \$3,510,050.69.

Mr. FRENCH. That would leave as spent on these projects approximately \$4,900,000.

Maj. GARLINGTON. Approximately, yes, sir; \$4,779,287.67.

Mr. FRENCH. Then it would be true that in comparison with prior to the war our harbors and coasts are infinitely better defended from this standpoint?

Maj. GARLINGTON. Yes, sir; I think there can be no question about that. There is one point I want to make, though, and that is that a large part of the expenditure was for the purchase of searchlights for use in France, from which we have only been able to use a certain amount in the coast defenses; but we have that material on hand and it is still, and will be, of value and can be available for an emergency. The point I am making is that the whole \$4,700,000 has not been spent on putting the lights at the batteries.

LIFE OF SEARCHLIGHTS.

Mr. FRENCH. How long do searchlights last?

Maj. GARLINGTON. A searchlight is a durable piece of apparatus. If the necessary spare parts are supplied a single searchlight can be kept in operation a long number of years.

Mr. FRENCH. Is this a type of machinery that is changing so frequently that it would be obsolete, in part, and new types required?

Maj. GARLINGTON. No, sir.

Mr. FRENCH. That would not be true of searchlights as it is true of guns?

Maj. GARLINGTON. No. However, experiments are constantly being made and improvement of searchlights is taking place all the time, but we feel that we now have a light that is a wonderful piece of mechanism and should be of value for a great many years to come.

Mr. FRENCH. It would hardly be superseded by another type within any reasonable time.

Maj. GARLINGTON. I do not think so; no, sir. The same size light is still being used as was in use before the war. Within the last five years there have been certain improvements in the type of the mechanism where the carbons are held, and other improvements permitting us to reduce the weight of the searchlights, which are considered quite remarkable. But the same general basic type and size of light is in use to-day that was in use before the war.

Mr. FRENCH. Those minor improvements, if they led to changes in the future along similar lines, could be made without any great expenditure of money.

Maj. CARLINGTON. Yes, sir. I would like to say in that connection that if we can have this reduced figure of \$100,000 appropriated, I believe that our searchlight project in the United States will be a very complete and good installation.

Mr. FRENCH. And could it be regarded in the future, say, for several years, as rather a completed system, with just appropriation enough to keep it in running order?

Maj. CARLINGTON. That is my opinion, except for the possibility of using mobile lights on towers, if the development of the tractor type is successful.

Mr. SLEMP. You might add to that that you would have to use some of those reserves for your 16-inch guns.

Maj. CARLINGTON. Oh, yes; the foregoing applies only to the lights for the batteries that are already completed, but it will be necessary, of course, to issue and install lights to illuminate the fields of fire of such new batteries as may be built.

CONSTRUCTION OF SEA WALLS AND EMBANKMENTS AT FORTIFICATIONS IN THE UNITED STATES.

Mr. SLEMP. The next item is for construction of sea wall and embankments. You had \$20,500 for this year, and you are asking \$18,500 for the coming fiscal year. Did you spend all of that money or will you spend it during this fiscal year?

Maj. CARLINGTON. On December 31, 1920, we had allotted \$18,292.16, leaving an unallotted balance of \$2,207.84, which we are holding for expenditure after this winter, and we will probably use all of that by the end of the fiscal year.

Mr. SLEMP. Please make an itemized statement of the expenditures this year.

Maj. CARLINGTON. The allotment of the 1921 funds is as follows: Portland, Me., sea wall, North Fork, Fort McKinley, \$800; Boston, repairs to sea wall, Fort Heath, \$12,000; New York, repairs to sea wall, Fort Hamilton, \$192.16; repairs of damage at Fort Tilden, \$300; Delaware, extension of the sea wall, Fort Mott, \$5,000, a total of \$18,292.16.

Mr. SLEMP. These are all approved by the district engineers? I mean, they were initiated by the district engineers and sent to the Chief of Engineers for approval?

Maj. CARLINGTON. And referred to the Chief of Coast Artillery for remark before the money was allotted.

Mr. SLEMP. Was there any other request for the use of that money besides the particular items you have mentioned?

Maj. CARLINGTON. There were several other requests that came in, but they were regarded as less urgent than those I have mentioned, some have been included in next year's estimate.

Mr. SLEMP. What is your estimated expenditure for next year?

Maj. CARLINGTON. The figure submitted to Congress of \$18,500 included an item of \$10,000 for unforeseen emergency work, but which has been dropped so as to reduce the total to \$8,500, which would be expended as follows: Extension of the sea wall at Fort

Hamilton, \$2,000; completion of the extension of the sea wall, Fort Mott, on the Delaware, \$5,000; repairs to sea wall at Fort Mott, \$500; and Puget Sound, repairs to the sea walls at Fort Worden, \$1,000.

Mr. SLEMP. Generally, of what do these repairs consist?

Maj. GARLINGTON. They are generally where blocks of the wall have been washed out by the action of the waves, and the repairs consist of transporting the material to the sites from the nearest quarries and dumping it in place.

Mr. SLEMP. They are rather small items, except at Fort Mott. Was much damage done to the sea wall there?

Maj. GARLINGTON. It is an extension at Fort Mott. The work consists of extending it from Fort Mott to the high bank on the shore of the river, and the total estimated cost is \$10,000; the work is now in progress under an allotment of \$5,000 from current funds.

Mr. SLEMP. What are the dimensions of the extension?

Maj. GARLINGTON. I will insert that in the record.

NOTE.—Dimensions, 150 feet long; 9 feet high; top width, 3½ feet; bottom width, 7 feet. Material, mass concrete.

Mr. FRENCH. I was wondering why you cut out the \$10,000 for emergency work.

Maj. GARLINGTON. The reason for that is that we now have under the heading of contingencies, Engineer Department, an estimate for \$50,000, so as to have all those contingencies in one place, and that being so, we thought it better to drop this amount here; it was also due to the fact that we were instructed to reduce this estimate so as to get within the \$15,000,000 total.

Mr. SLEMP. The real fact is that if there were going to be contingencies, you wanted them carried under the one heading?

Maj. GARLINGTON. Yes.

Mr. FRENCH. I can understand how it ought to be somewhere in the bill, but I would not want to drop it on the idea of economy if it is absolutely necessary.

Maj. GARLINGTON. This is the way to look at it, that having an appropriation for contingencies, it can certainly be applied to emergency work of this kind.

Mr. FRENCH. That is good, and I think your arrangement is better.

REPAIR AND RESTORATION OF DEFENSES OF GALVESTON, TEX.

Mr. SLEMP. The next item is for the repair and restoration of sea walls, retaining walls, and fill, and for urgent repairs to batteries in the defenses of Galveston, Tex., \$10,000. That you have withdrawn?

Maj. GARLINGTON. Yes, sir.

CONTINGENT EXPENSES, SEACOAST FORTIFICATIONS, UNITED STATES.

Mr. SLEMP. The next item is for contingent expenses incident to the construction of seacoast fortification and their accessories, under the Engineer Department. You had \$50,000 for last year, and you ask \$50,000 for next year?

Maj. GARLINGTON. The total allotted to December 31 was \$37,843.89 leaving unallotted \$12,156.11, which we are holding for contingencies during the remainder of the current fiscal year.

Mr. SLEMP. I wish you would put in the record an itemized statement of that expenditure.

Maj. GARLINGTON. Very well.

Contingent expenses, seacoast fortifications, 1921—Application of funds.

Portland, Me.: Extension roadway to Engineer wharf, Fort Williams.....	\$600.00
New York:	
Widening epis for mortars, Fort Tilden.....	2,400.00
Shelter for mobile antiaircraft guns—	
Fort Hancock.....	600.00
Fort Totten.....	200.00
Delaware, fencing Forts DuPont and Mott.....	3,300.00
Norfolk:	
Leasing reservation, Willoughby Spit.....	100.00
Siding for 12-inch railway mount, Fort Story.....	400.00
Filling gun wells, batteries Anderson and Ruggles, Fort Monroe.....	480.00
Removal equipment, old steam-power plant, Fort Monroe, and demolishing building.....	500.00
Key West, Fla., for shore-protection work, Fort Dade.....	9,250.00
San Francisco, Calif., shelter for mobile antiaircraft guns.....	1,704.00
Honolulu:	
For erection of shelter for eight mobile antiaircraft guns, Fort Kamehameha.....	2,000.00
For removal and reconstruction of railroad track to Engineer reservation, Honolulu.....	2,000.00
Manila:	
Completing bombproofs, Infantry sector garrison.....	3,000.00
Antiaircraft defenses.....	1,800.00
Panama:	
Protection of casemate, etc., Fort Grant.....	6,001.89
Modification of 14-inch emplacements.....	3,508.00
Total.....	37,843.89
Unallotted, Dec. 31, 1920.....	12,156.11
Appropriated, act May 21, 1920.....	50,000.00

Mr. SLEMP. The nature of this appropriation does not admit of itemization for next year, does it?

Maj. GARLINGTON. No, sir; it does not admit of itemization at all, because it was intended specifically to cover work which could not be foreseen.

Mr. SLEMP. It is a new item that has been introduced here to take care of the unforeseen possibilities, such as violent storms, or some special damage in some way that requires immediate action. We let it go through last year at \$50,000. Do you not think that that is rather large sum for things that have to be done immediately, and that can not be estimated for?

Maj. GARLINGTON. We are asking for this with this point of view, and I would like to present it as most essential to our successful operation, because of the fact that when we are submitting these estimates as now in February, we, of course, have to try to foresee what work will be completed from funds on hand during the current fiscal year, as far as we can. Now, it will happen in some cases that we will be wrong. Some job for which we have the money will reach the end of the fiscal year and be almost completed, but not quite so. Some of the funds may even be covered into the Treasury.

Mr. SLEMP. Of course, something will be required for this purpose, but the only question is as to the amount.

Maj. GARLINGTON. It is not entirely for unforeseen work, but as I said, it is for work which would otherwise fail because of the lapse of fiscal year funds.

Mr. FRENCH. Let me inquire in reference to this item whether or not most of this money would be for material and labor that would fluctuate in amount with the price of material and the price of labor?

Maj. GARLINGTON. Yes, sir.

Mr. FRENCH. Then we could take into consideration in connection with that item the element of a possible reduction when we come to fix the particular amount?

Mr. SLEMP. As a matter of fact you have not had many unforeseen emergencies this fiscal year, have you, affecting the seacoast defenses? We have not had any violent storms or sudden breaking away of something that needed instant attention from the Engineer Department.

Maj. GARLINGTON. No, sir; we have had very little work of that character.

Mr. SLEMP. That is what this item is really intended to cover?

Maj. GARLINGTON. It is felt that the provision of some money with which to finish up loose ends at the end of the fiscal year would be a wise procedure.

Mr. SLEMP. The question is whether we are not getting a little strong on that.

Maj. GARLINGTON. It is true that we have had only one year's experience to go on, or to indicate how far that \$50,000 would go. That is why we are sticking to last year's figures. We know of no better way of getting at it than to take the expenditure of the money last year.

FORTIFICATIONS IN INSULAR POSSESSIONS.

PROTECTION, PRESERVATION, AND REPAIR OF FORTIFICATIONS—HAWAIIAN AND PHILIPPINE ISLANDS.

Mr. SLEMP. The next item is on page 18, "For protection, preservation, and repair of fortifications," etc. Under that item for the Hawaiian Islands, you are asking \$15,000, and you had \$15,000 for the same purpose last year. For the Philippines, under the same item, you have a current appropriation of \$50,000, and you are asking \$50,000 for the next fiscal year. You never seem to have any one year less than the preceding year. Retrogression does not seem to be a failing of the Engineer Department. You will itemize your expenditures for this fiscal year and itemize your anticipated expenditures for the next fiscal year.

DETAILS OF ESTIMATES.

Maj. GARLINGTON. I have not here the items of last year's allotments for this purpose, but I have an itemized statement in support of the estimate for next year.

Mr. SLEMP. You have not obtained the data from the Philippines as to how they have used the money, or what balance they have on hand for this fiscal year?

Maj. GARLINGTON. We have that data up to December, but I do not have it with me. I can supply that for the record.

Of the sum of \$50,000 appropriated for preservation and repair, Philippine Islands for the fiscal year 1921, \$43,000 has been allotted to the district engineer at Manila. The unallotted balance under this allotment under date of December 1, 1920, was \$22,561.02.

The following work has been accomplished under this allotment during the period July 1 to November 30, 1920:

Fort Mills:

- Repainting power and plotting rooms at batteries.
- Repaired roads and trails pertaining to land defense.
- Repaired torpedo structures.
- Repaired doors and windows at batteries and fire-control stations.
- Repaired handrailings at Battery Wheeler.
- Repaired roof, Battery James.
- Repaired plumbing, Battery Geary.
- Repaired roofs of mine storehouses.
- Repaired windows, Battery Cheney.
- Repaired cable tanks.
- Repaired plumbing at Batteries Cheney, Crockett, Grubbs, Morrison, Ramsay, and Way.
- Repaired and painted plotting room M'1M'1.
- Repaired drainage at cable tanks Nos. 1, 2, 3, and 4.
- Repaired south mine wharf.
- Made 24 signed shutters for searchlights.

Fort Hughes:

- Repaired ammunition trolley hoist, Battery Craighill.
- Repaired plumbing, Battery Craighill.
- Repaired door at Battery Fuger.
- Completed repairs on casemate.
- Repaired crane in mine storehouse.
- Repaired shot hoist, Battery Gillespie.
- Repaired plumbing, Batteries Craighill, Gillespie, and Woodruff.

Fort Drum:

- Repaired salt-water pumps.
- Repaired ventilating fans.
- Repaired air compressor.
- Cleaning and painting ventilators and cage mast.
- Painted ladders and salt-water tanks.
- Painted ventilator shafts and railings at 6-inch casemates (75 per cent completed).

Fort Frank:

- Repaired windows at fire-control stations.
- Reset bolts holding exhaust pipe, 25-kilowatt set, Battery Crofton.
- Modified exhaust header for 25-kilowatt sets.
- Repaired plumbing at all batteries.

Fort Wint:

- Repaired loading platform, Battery Warwick.
- Repaired lighting systems in Batteries Warwick and Jewell.
- Repaired searchlight shelters.
- Placed azimuth-instrument pedestal, B. C. Jewell.

Mr. SLEMP. What are your estimated expenditures for next year?

Maj. GARLINGTON. The items for protection, preservation, and repair of fortifications, Hawaiian Islands, for 1922, are preservation and repair of submarine mine wharf, \$3,900; repair and relocation of railroad, Engineers' wharf, \$1,500; repairs to latrines, \$1,025; barges and boats, \$1,600; miscellaneous, \$1,285; materials and repairs, \$2,000; labor, \$2,000; superintendents and contingencies, \$1,340.

Mr. SLEMP. A lot of that has no relation to the fortification, as, for instance, the repairs to latrines.

Maj. GARLINGTON. That is for latrines located at the batteries. I have a statement here covering that which says that many of the batteries in the district are several years old, and require minor repairs continually. "These in the aggregate amount to a considerable sum. As the different units of the defenses increase in age,

the amount of funds necessary for their upkeep also increases. The water in the Island is very destructive of metals, and the latrine fixtures and water pipes need renewing frequently."

I think the question as to the latrines is covered by the district engineer's remark there about the destructiveness of the water.

For the Philippines, the district engineer there submitted an estimate of \$108,000 needed for the next fiscal year, and it was returned to him for revision. He was instructed that he must try to arrange the work so that \$85,000 would keep things going. That was the total amount of his estimate for the previous year. For last year there was appropriated \$50,000, so that we have only estimated for \$50,000. The work needed out there is itemized under his \$85,000 estimate.

Mr. SLEMP. Suppose you put in that \$85,000 estimate, and indicate the items that you have cut out so as to make the amount \$50,000. Mainly, the \$50,000 would take care of what items?

Maj. GARLINGTON. Repairs to doors and windows; repairs to land defense structures; repairs to fire control structures; repairs to search-light shelters; repairs to conduits; general maintenance items, and material needed by the Artillery for general maintenance, \$15,000. [See p. 135.]

Mr. SLEMP. That is a rather indefinite way of putting it. You give a number of items, and then give an item of \$15,000 covering general expenditures, that being about one-third of what you ask.

Maj. GARLINGTON. That is simply the distribution into structural and nonstructural work over in the Philippines.

Mr. FRENCH. There is nothing at all included there for new work?

Maj. GARLINGTON. No, sir; I have a statement here in reference to the items of materials and supplies required for general maintenance of artillery, which I will read:

Miscellaneous items and supplies for artillery..... \$15, 000

G. O. 31, W. D., 1910, requires the Engineer Department to furnish materials and supplies required for the upkeep and repair of emplacements, fire control structures, etc., which involves the procurement of a large amount of paints, oils, brushes, nails, bolts, hose, lumber, etc. The Engineer Department is also required to furnish lumber for piling projectiles, and now has in hand a coast defense requisition for about \$4,250 worth of lumber for this purpose due to the increased amount of ammunition now being furnished. This item of lumber alone amounts to about one-fourth of the total amount requested.

The item of lumber referred to in the above statement amounts to about one-fourth of the total amount of \$15,000.

Mr. SLEMP. What are the other large items there?

Maj. GARLINGTON. Repairs to submarine mine wharf, \$5,000.

Mr. SLEMP. What is the explanation of that?

Maj. GARLINGTON. That is to take care of the deterioration of the wharf during the time it has been in operation.

Mr. SLEMP. I do not see the difference between one wharf and another. Why do they have a special submarine mine wharf?

Maj. GARLINGTON. It is a wharf built at the storehouse for mine matériel, and it is the one to which the mine-planting boat ties up and from which the mines are loaded into the mine planters.

Mr. SLEMP. I did not understand that you had any submarine mine wharf exclusively for that purpose, and that is not used for commercial purposes.

Maj. GARLINGTON. Yes, sir; there is a mine wharf.

Mr. SLEMP. Can you give a statement in regard to that mine wharf, stating when it was built and its present condition?

Maj. GARLINGTON. Yes, sir; I will insert that.

(The statement referred to is as follows:)

Fort Mills, P. I.—North side mine wharf; reinforced concrete. Original structure built (timber), 1907–1909; rebuilt, 1912; extension built, 1913–14. Condition January 1, 1920, reported good. South side mine wharf, built 1914; reinforced concrete with removable wooden deck. Condition January 1, 1920, reported fair.

Maj. GARLINGTON. The overhead expense of maintaining the engineer office and its floating plant during the next year, when the new construction will be reduced over there, totals \$25,000.

Mr. SLEMP. Is not that entirely out of the question?

Maj. GARLINGTON. \$15,000 of that provides for the office in Manila and suboffice at Fort Mills. The organization proposed by the district engineer is as follows: Manila office, one assistant engineer, \$3,600; tracers, \$1,320; chief clerk, \$2,400; financial clerk, \$1,800; three subclerks, \$2,700; messenger, \$600; and stationery, water, telephone, etc., \$1,000, making a total for Manila office of \$13,420; Fort Mills suboffice, one clerk \$1,800, two clerk-timekeepers \$1,200, one storekeeper \$1,500, one general foreman \$1,800, one junior engineer \$2,400, making a total for Fort Mills suboffice of \$8,700 and a total for the two of \$22,120.

NOTE.—The above authorization is considered to be the minimum with which work can be efficiently accomplished, and the estimate of \$15,000 submitted for the fiscal year 1922 for this purpose clearly is insufficient. As it is now impossible to maintain an organization at the present rates of pay in comparison with the rates offered in commercial activities, it is apparent that a reduction of the above estimate of \$22,120 to the figure of \$15,000 submitted can not be accomplished by reducing salaries.

Mr. SLEMP. There is no construction work going on in the Philippines, is there?

Maj. GARLINGTON. There is at present and there will be some in the next fiscal year.

Mr. SLEMP. What is being constructed in the Philippines?

Maj. GARLINGTON. They are finishing the 12-inch battery.

Mr. SLEMP. That project will be completed this fiscal year, will it not?

Maj. GARLINGTON. It is going on at present. The principal work that will take place next year will be the completion of the fire-control system out there, which involves the building of stations at various outlying places. This work is going on, and it will not be completed this fiscal year.

Mr. SLEMP. How much will it cost?

Maj. GARLINGTON. \$12,000.

Mr. SLEMP. You will not want to keep a \$25,000 organization to complete work of that kind, will you?

Maj. GARLINGTON. No, sir; but the upkeep, preservation, repairs, sending of supplies, and the other work which comes under this estimate, will require an engineer force out there. This organization is ordinarily maintained out of funds appropriated for construction work, but the construction in the next fiscal year will be reduced so much that this appropriation for preservation and repairs will be the only one against which these salaries can be charged. The total of the reduced estimates for engineer department work, not including fire control, for the Philippines for 1922 is \$129,000.

Mr. SLEMP. How much of that \$25,000 is for the floating plant?

Maj. GARLINGTON. \$10,000.

Mr. SLEMP. That is to be used only in connection with construction work?

Maj. GARLINGTON. I have a statement here covering that: The defenses of the Manila district are located on six islands, together with some additional work on the mainland. The only means of communication between those works is by means of a launch, and to provide for the carrying of the working forces and the necessary supplies and materials from one location to another two small barges are also necessary. This plant has to be kept in repair. The cost of maintaining this plant during the past fiscal year was—operation and repair of barges \$8,722.36, and operation and repair of launches \$11,279.89, or a total of \$20,002.25.

Mr. SLEMP. And you estimate that you can get along in the next fiscal year—

Maj. GARLINGTON (interposing). With \$10,000 for that purpose.

Mr. SLEMP. Will that keep the same number of vessels in operation?

Maj. GARLINGTON. That does involve a reduction in the amount of floating plant that will be in operation.

Mr. SLEMP. To what?

Maj. GARLINGTON. I do not know exactly; that will depend so much on the amount of work going on.

Mr. SLEMP. Does your estimate for the floating plant apply to various vessels, or a group of vessels, as the case may be?

Maj. GARLINGTON. Yes, sir.

PURCHASE AND INSTALLATION OF SEARCHLIGHTS FOR DEFENSES IN PHILIPPINE ISLANDS.

Mr. SLEMP. The next item is "For the purchase and installation of searchlights for the defenses of most important harbors of the Philippine Islands." You ask here for \$3,000, and there is a supplemental estimate of \$6,000, making \$9,000. You got along last year with \$2,000.

Maj. GARLINGTON. We have reduced that figure to the original estimate of \$3,000.

Mr. SLEMP. You have left off six shelters?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. What do you use the \$3,000 for?

Maj. GARLINGTON. That is for two shelters at \$1,500 each. Two of the original searchlights have been finished. It was estimated to build two shelters for four more that are to be sent out. The item of \$6,000 was to provide shelter for them also.

Mr. SLEMP. Do you put the searchlights in shelters and open up the shelters when you want to use the searchlights?

Maj. GARLINGTON. Yes, sir. This is for shelters for the mobile searchlights mounted on Mack trucks, which are automobile trucks. The shelter is virtually a garage.

Mr. SLEMP. The searchlights are protected from the weather by shelters at the fortifications?

Maj. GARLINGTON. Yes, sir; they are inclosed in a structure which shelters them from the elements. In some cases they are used by letting down the sides, and in other cases by running them out on cars or by raising them on an elevator. When not in use, they must be sheltered.

Mr. SLEMP. This provides shelter for two Mack units that have been sent out?

Maj. GARLINGTON. For two Mack units sent to the Philippines.

Mr. SLEMP. They are attached to Cadillac trucks?

Maj. GARLINGTON. No, sir; they are on Mack trucks. The Mack truck is a big 5-ton truck, self-propelled.

Mr. SLEMP. It has the entire searchlight unit on it?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. How many have we of that type in continental United States?

Maj. GARLINGTON. Approximately 140, to the best of my recollection.

Mr. SLEMP. We are not buying any more?

Maj. GARLINGTON. No, sir; it was found to be too heavy.

Mr. SLEMP. Where are the 140?

Maj. GARLINGTON. We have a portion of them distributed and the others are in storage.

Mr. SLEMP. Where?

Maj. GARLINGTON. At Jeffersonville, Ind., in the Engineer depot there.

Mr. SLEMP. The Cadillac is a truck on which the searchlight is mounted?

Maj. GARLINGTON. It is a Cadillac touring car chassis, and the light is mounted on a little four-wheel pushcart, and when traveling over the roads it is carried right on the Cadillac chassis. When it is run off the car, it can be used within a radius of two or three hundred feet of where the Cadillac is.

MAINTENANCE AND REPAIR OF SEARCHLIGHTS AND ELECTRIC LIGHTS AND POWER EQUIPMENT FOR SEACOAST FORTIFICATIONS, HAWAIIAN AND PHILIPPINE ISLANDS.

Mr. SLEMP. The next item is for maintenance and repair of searchlights and electric light and power equipment for seacoast fortifications, etc. For the Hawaiian Islands under this item you ask \$34,300, and for the Philippine Islands \$98,000. Last year you had \$7,000 for the Hawaiian Islands and \$25,000 for the Philippine Islands.

Maj. GARLINGTON. The reason for the increase in that item is similar to that in the item for continental United States, where, as I explained, we have had to put an additional amount needed for gasoline and lubricating oil for the 25-kilowatt sets and portable searchlight units. Our estimate is made up of \$7,000 for the ordinary supplies and maintenance, such as we formerly had under this appropriation, and \$27,300 for gasoline and oil. We have reduced the estimate from \$34,300 to \$25,000. Under the \$25,000 figure, \$7,000 is intended for ordinary supplies, leaving \$18,000 for gasoline and oil.

Mr. SLEMP. How many kilowatt sets do you operate with that?

Maj. GARLINGTON. Twenty-seven 25-kilowatt sets and two 5-kilowatt sets.

Mr. SLEMP. How many of the portable searchlights do you operate under this?

Maj. GARLINGTON. Three.

Mr. SLEMP. Now, then, we have brought up the same proposition that these 25-kilowatt sets are reserve battery equipment, are they not?

Maj. GARLINGTON. No, sir; out in the islands they are the principal reliance for the batteries.

Mr. SLEMP. Will you check up with regard to these two items, as you were requested to do with regard to the same items for continental United States?

Maj. GARLINGTON. I will do so. Do you desire a statement of what proportion of these 25-kilowatt sets are duplicated by some other sources of power?

Mr. SLEMP. And what the basis for operating these respective plants is, judged from the estimates?

Maj. GARLINGTON. Yes, sir. [See p. 135.]

Mr. SLEMP. The lubricating oil will be a very small proportion of the whole, will it not?

Maj. GARLINGTON. Yes, sir; we figure to use 29 gallons for each 25-kilowatt set.

Mr. SLEMP. Oil or gas?

Maj. GARLINGTON. Lubricating oil.

Mr. FRENCH. Do you know what your requisitions are?

Maj. GARLINGTON. It averages about 1 barrel a year for one set under normal operating conditions.

Mr. SLEMP. Do you get that from the Quartermaster General?

Maj. GARLINGTON. No, sir.

Mr. SLEMP. Do you know what your total requisitions for oil on the quartermaster were last year?

Maj. GARLINGTON. No, sir. I will try to get that information for the continental United States. I assume that the data about the continental United States would apply just the same, simply a difference of detail.

Mr. SLEMP. Please insert any other details with regard to the Philippines.

Maj. GARLINGTON. That was the Hawaiian Islands.

Mr. SLEMP. Yes, sir; and the Philippine Islands. There used to be appropriated only \$2,500, and last year there was appropriated \$25,000, if I remember, to make up a sort of reserve, and you are now regarding that as a constant factor—the \$25,000—and asking for \$73,000 more?

Maj. GARLINGTON. The estimate submitted was \$98,000, which included also the new factor of the gasoline and lubricating oil which had formerly been furnished by the Quartermaster Department, leaving the basis of the estimate as follows: Thirty-one thousand dollars for the ordinary supplies, which is an increase of \$6,000 over the \$21,000 appropriation for 1921, and the balance, or \$67,000, for the gasoline and lubricating oil. The figure of \$98,000 we have been directed to reduce to \$68,000.

Mr. SLEMP. How is that divided?

Maj. GARLINGTON. The \$31,000 for the ordinary supplies has been kept and the gasoline and lubricating oil has been reduced from \$67,000 to \$37,000.

Mr. SLEMP. An arbitrary reduction?

Maj. GARLINGTON. A reduction advised by the Chief of Coast Artillery's office, with the understanding that it would mean reduced running time of his 25 kilowatt sets.

Mr. SLEMP. Please give us the same information about the use of the kilowatt sets, the time they run and why they should run at all, as we have asked for in continental United States.

Maj. GARLINGTON. Yes, sir. [See p. 135.]

LAND DEFENSES IN HAWAIIAN ISLANDS, INCLUDING PROCUREMENT AND INSTALLATION OF SEARCHLIGHTS AND ACQUISITION OF LAND AND RIGHTS OF WAY.

Mr. SLEMP. The next item is for land defenses in the Hawaiian Islands, including the procurement and installation of searchlights and the acquisition of land and rights of way, \$500,000.

Maj. GARLINGTON. That item has been reduced to \$248,133. That figure was arrived at arbitrarily, it being the last item that we had to cut down to get within the total.

Mr. SLEMP. What will you use that for?

Maj. GARLINGTON. The \$500,000 was submitted to continue the building of the road system which we explained in detail at last year's hearings for the land defenses of the islands.

Mr. SLEMP. We allowed you \$130,000 last year. Please give us an account of the \$130,000.

Maj. GARLINGTON. You remember, sir, in that estimate as submitted, \$60,000 was for use on the other land-defense items and the conversion of the mortar battery. The remodeling of the mortar battery at Birkhimer was \$17,050.

Mr. SLEMP. What was the nature of the work?

Maj. GARLINGTON. It was the building of new firing blocks for the mortars and the conversion of the old pits into ammunition storage magazines. The blast effect in their location in pits was so great that the men could not stand it.

Mr. SLEMP. The reverberation, and so forth?

Maj. GARLINGTON. Yes, sir.

Fire control on Diamond Head for the use of that battery, \$1,000; antiaircraft gun shelter at Kamehameha, \$150; then an allotment to the supply section of the office of the Chief of Engineers for material for rewiring the Birkhimer battery, \$1,000; and to road construction, \$110,800. In other words, it was not necessary to use the whole \$60,000 for the old land defenses, and we were able to put more on the road construction.

ROAD CONSTRUCTION BETWEEN SCHOFIELD BARRACKS AND THE SOUTHERN COAST.

Mr. SLEMP. What road construction did you do there?

Maj. GARLINGTON. Only \$13,112.98 has been spent on that work, which was on the section of the road No. 256, as designated on our map showing that.

Mr. SLEMP. From what point?

Maj. GARLINGTON. It started at a point a few miles south of Schofield Barracks and went south; it was one of the main stretches between Schofield Barracks and the southern coast, in the direction of Honolulu.

Mr. SLEMP. In the direction of Honolulu?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. That is simply a repair and maintenance proposition?

Maj. GARLINGTON. No, sir; they had to secure a right of way.

Mr. SLEMP. There is a fine road from Schofield to Honolulu?

Maj. GARLINGTON. I would much prefer to have a map here before attempting to discuss that.

Mr. SLEMP. You were going to make a statement as to the expenditure of the \$130,000 and you had something over \$100,000 to expend on roads. You said you bought some rights of way and that some construction work had been done from Fort Schofield toward Honolulu.

Maj. GARLINGTON. Yes, sir. There was an allotment for road construction on Oahu of \$110,800, of which \$13,112.98 had been expended up to December 31.

Mr. SLEMP. On how many miles did you spend that money?

Maj. GARLINGTON. The data here shows only that it was the first section of that road, No. 256; that the right of way was secured, plans and specifications prepared, and the construction plant being assembled. I have not the data here to show the length of that road.

Mr. FRENCH. Is that the distance from Schofield Barracks to Honolulu?

Maj. GARLINGTON. No, sir; that is only for the first section, which is a few miles.

Mr. SLEMP. You do not know anything about the expenditure of the money during this fiscal year other than what you have stated?

Maj. GARLINGTON. I have not the data here from which to answer those questions, but that data is available.

Mr. SLEMP. I wish you would get that and put it in the record.

Maj. GARLINGTON. Very well.

NOTE.—Length of road No. 256, 10 miles. Plans and specifications for section 2,883 feet long approved and work in progress now. Work on remainder of road will be prosecuted under same allotment as soon as plans and specifications are approved.

Mr. SLEMP. In regard to your proposition for next year—\$500,000—does that differ in any respect than when you made your statement to the committee last year?

Maj. GARLINGTON. No, sir; it is to continue work on that same project.

Mr. SLEMP. It was a \$10,000,000 proposition as presented to the committee last year, and then it was cut to \$5,000,000.

Maj. GARLINGTON. Those are the approximate figures.

Mr. SLEMP. Do you wish to add anything to your statement of last year on this subject?

Maj. GARLINGTON. No, sir; it has not been necessary to revise the details of this project, and it is intended to apply this along the same lines and under the same general plan as was presented to the committee last year.

Mr. SLEMP. Is there any difference in the cost of construction?

Maj. GARLINGTON. Not in the estimate, because, as you can see, so little work has been done so far that we have not the experience to make it possible to revise the estimate in any way at this time.

Mr. SLEMP. And your estimate is based upon the \$5,000,000 proposition, one-tenth to be asked for during the coming fiscal year?

Maj. GARLINGTON. Yes, sir.

PROCUREMENT OR RECLAMATION OF LAND FOR FORTIFICATION AND COAST-DEFENCE PURPOSES IN HAWAIIAN ISLANDS.

Mr. SLEMP. The next item is, "For procurement or reclamation of land, or rights pertaining thereto, needed for the site, location, construction, or prosecution of works of fortifications and coast defenses in the Hawaiian Islands," and you are asking \$84,240.

Maj. GARLINGTON. That item should be withdrawn.

Mr. SLEMP. The reason for that is you have decided to place those guns on Government lands?

Maj. GARLINGTON. We are now trying to arrange with the Navy Department for the use of the naval reservation for the emplacement of those guns intended for Barbers Point, so the item that was appropriated last year of \$25,760 for purchase of land at that point will not be needed if we can get the transfer of land from the Navy Department.

Mr. SLEMP. That will be a better site, near Pearl Harbor?

Maj. GARLINGTON. It was decided that that would be a better place, as it would give a better radius of fire.

Mr. SLEMP. That amount will be returned?

Maj. GARLINGTON. If the arrangement with the Navy Department goes through. But the \$84,240 which we have withdrawn was for another purpose. It had been intended to cover the site at Waiahia, on the north side of the island, the construction of which battery has been dropped, due to the fact that it has been recommended by the Chief of Coast Artillery that railway guns only be used for the defense of that shore.

Mr. SLEMP. You have not the railroad?

Maj. GARLINGTON. Not at the present time, except narrow gauge.

PLANS FOR FORTIFICATIONS AND DEFENSE WORKS, PHILIPPINE AND HAWAIIAN ISLANDS.

Mr. SLEMP. The next item is, "For preparation of plans for fortifications and other works of defense at the following localities: Hawaiian Islands, \$3,000, and Philippine Islands, \$3,000." What is the special need for the Philippines? You might have some need for the Hawaiian Islands, but for the Philippines you are not planning anything?

Maj. GARLINGTON. The item for the Hawaiian Islands will be enough to take care of all the plans for use of the mobile batteries and the new work in Hawaii, and the Philippine Islands were included so that if any further work came up we would have funds to pay it from. It can not be justified as well as that for the Hawaiian Islands.

Mr. SLEMP. You have an engineering board——

Maj. GARLINGTON (interposing). An engineering office.

Mr. SLEMP. You have an engineering office in the Philippines with not very much of an organization, and so I would not think that you would need that money for the Philippines.

Mr. FRENCH. The Hawaiian Islands item would take care of the engineering work, plans, etc., for the roads?

Maj. GARLINGTON. That is for the seacoast defenses.

Mr. FRENCH. And other works of defense—the roads could not be a part of the defenses?

Maj. GARLINGTON. It would be appropriate to pay for work on plans for these roads from that appropriation, although this is intended to cover the preparation of plans for works for which no specific appropriation is available. Having the money for the road work, the detailed plans and specifications are drawn up and paid for from that appropriation. This is for work which we are getting in shape to submit to Congress.

Mr. FRENCH. That is, looking ahead?

Maj. GARLINGTON. Yes, sir.

CONSTRUCTION OF ENGINEER WHARF, FORT MILLS, P. I.

Mr. SLEMP. The next item is, "For the construction of engineer wharf, Fort Mills, Philippine Islands, \$15,000." Do you not want to withdraw that?

Maj. GARLINGTON. That has been reduced to \$5,000. The \$75,000 appropriation for the construction of the wharf was allotted on June 30, and the work is under way, and it is expected that it will be practically completed by June 30, 1921, as far as the wharf proper is concerned. The additional funds are required to complete the wharf and to provide cranes for its most efficient use. The original figure of \$15,000 was submitted by the district engineer to cover that, and he states that the cranes alone will cost approximately \$12,000.

Mr. FRENCH. \$3,000 is for the actual completion of the wharf?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. As I understand, you have reduced that to \$5,000?

Maj. GARLINGTON. To \$5,000.

Mr. FRENCH. You have cut out the cranes?

Maj. GARLINGTON. We cut out the cranes.

Mr. SLEMP. Perhaps you have been able to save enough money to buy the cranes out of the existing appropriation?

Maj. GARLINGTON. No, sir. They will not be provided. We had to reduce, and that is one of the times we cut out.

Mr. SLEMP. If you leave out the purchase of the cranes you would need no facilities for their use, and so the entire \$15,000 could be left out?

Maj. GARLINGTON. No, sir; because of the fact that the wharf will not be entirely completed by the end of the year. The report is that it will be practically completed, but to get the fenders on and the snubbing posts to tie the boats to he wants from \$3,000 to \$5,000 to complete it. He had submitted a total figure of \$15,000 to cover that and the cranes also, and if we eliminate the cranes, which were \$12,000, he could get along with \$3,000 instead of \$5,000.

CONSTRUCTION OF GUN AND MORTAR BATTERIES, INCLUDING RAILROADS,
ETC., HAWAIIAN ISLANDS.

Mr. SLEMP. The next item is, "For construction of gun and mortar batteries, including railroads and other facilities necessary for the installation of railway and antiaircraft artillery," \$200,000. You have changed the language there. There is nothing asked for the Philippines.

Maj. GARLINGTON. The item for the Hawaiian Islands is to begin the construction of the two 16-inch emplacements about which we were talking, which were originally to be located at Barbers Point, but are now intended for location near Keahi Point on the naval reservation.

Mr. SLEMP. Did you not begin that work last year with the appropriation of \$50,000 which you had?

Maj. GARLINGTON. No, sir.

Mr. SLEMP. What did you spend the \$50,000 for?

Maj. GARLINGTON. We are going to have some money which, if we do not get started on the 16-inch emplacements, will revert to the Treasury. That estimate last year was intended to cover the completion of the 12-inch long-range battery at Ahua Point. That battery was completed during the fiscal year 1920 and it was not necessary to use any of the \$50,000 for it. The actual allotments under that appropriation were for modifying platforms at Battery Randolph, \$300, preliminary work on the 16-inch emplacements, \$5,000, and that leaves unallotted \$44,700.

Mr. SLEMP. Do you prefer to regard this project as beginning with the next fiscal year and to return that money to the Treasury and ask for \$200,000?

Maj. GARLINGTON. We would prefer to be allowed to regard this balance as available for starting work on the 16-inch emplacements if the land matter and the use of the naval reservation can be cleared up, but if we do not get started on the 16-inch emplacement work this would lapse and return to the Treasury.

Mr. SLEMP. In case you do get started, can you reduce the \$200,000?

Maj. GARLINGTON. No, sir; that is only a partial estimate of the total cost of the battery.

Mr. FRENCH. What will be the cost of the project?

Maj. GARLINGTON. If the battery is put in the dispersed type, such as we are asking at Fort Tilden, the figure should be approximately the same as that which I gave in my testimony in regard to that type of battery in the United States, namely, about \$300,000. If it is the other type, it will run up to the other figure of \$1,200,000.

Mr. SLEMP. \$300,000 for the two guns?

Maj. GARLINGTON. Yes, sir.

Mr. FRENCH. Will not considerable of that money be used for railroads to accomplish the handling of the guns?

Maj. GARLINGTON. The guns are to be on fixed emplacements.

Mr. SLEMP. It says, "including railroads."

Maj. GARLINGTON. That is just to have the language conform to the law language proposed for the United States.

Mr. SLEMP. You are not asking for any money for railway or railway facilities?

Maj. GARLINGTON. No, sir.

Mr. SLEMP. I do not see any need for that.

Maj. RUHLEN. That is for the railway artillery allocated to the Hawaiian Islands.

Mr. SLEMP. You are not asking for the expenditure of any money?

Maj. GARLINGTON. One of the jobs that arises in connection with using this railway artillery that has been made available is to build short spur tracks off of the main lines. There has been no appropriation that would really cover that kind of work, and as the use of this artillery is beginning in the coast defenses it seemed advisable to have this language so that it would permit the use of a small amount of it during the year.

Mr. SLEMP. Do you not think it would be advisable to put that in a separate item with an estimate as to what your proposition is?

Maj. GARLINGTON. Of course, our idea in doing that was that this use of the railway artillery is rather new and experimental, and in order to be able to make some of those experiments and to facilitate the carrying out of those experiments.

Mr. FRENCH. The railroad building part of the item is very small in comparison with the whole item?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. You have not any railway material over there at all?

Maj. GARLINGTON. We have a certain number of 12-inch mortars on the narrow-gauge trucks.

Mr. SLEMP. In Hawaii?

Maj. RUHLEN. They have been ordered sent.

Mr. SLEMP. You are not asking for anything at this time in the Philippines?

Maj. GARLINGTON. No, sir.

Mr. SLEMP. When do you expect to complete the emplacements in the Hawaiian Islands—in two years?

Maj. GARLINGTON. It depends on the type of battery finally put there. The dispersed type we estimate will require about two years, and the other type of protected battery from three to four years.

Mr. SLEMP. When will the War Department officials determine and what is this committee to understand in regard to their attitude now?

Maj. GARLINGTON. That it would be preferable, if the necessary amount of land can be obtained, to use the dispersed type.

I would like to say, before leaving the batteries in the Hawaiian Islands, that the reduced figure on the basis of a total bill of \$15,000,000 is \$150,000 instead of the \$200,000 in your book.

Mr. SLEMP. That, with the forty thousand and some odd dollars left over, will enable you to spend about \$200,000?

Maj. GARLINGTON. Yes.

PANAMA CANAL FORTIFICATIONS.

MAINTENANCE OF CLEARINGS AND TRAILS.

Mr. SLEMP. The next item is for the Panama Canal fortifications. You have omitted the item for the maintenance of clearings and trails, \$30,000.

Maj. GARLINGTON. Yes, sir.

PROTECTION, PRESERVATION, AND REPAIR OF FORTIFICATIONS, PANAMA CANAL.

Mr. SLEMP. The next item is for protection, preservation, and repair of fortifications of the Panama Canal, for which there may be no special appropriation available, including structures erected for submarine mine defense, and for maintaining channels for access to submarine mine wharves. You had \$25,000 last year, and you are asking \$25,000 for next year. Did you spend all of that money last year?

Maj. GARLINGTON. That has all been allotted to the district engineer, and will all be expended before the close of the present fiscal year. The estimates submitted by the district engineer for the fiscal year 1922 included items of specific preservation and repair work totaling \$55,500 for the defenses of Balboa, and \$50,740 for the defenses of Cristobal, a total of \$106,240 for both ends of the canal. Instead of submitting that estimate to Congress it was reduced to the figure appropriated and spent during the current fiscal year, namely, \$25,000. The total cost of the fortification structures, for the maintenance of which this will be spent, is approximately \$6,000,000, so that if you were to reduce this maintenance charge to a percentage basis it would be about four-tenths of 1 per cent.

Mr. FRENCH. Is any of the item intended for new work?

Maj. GARLINGTON. No, sir; this is entirely for ordinary upkeep and maintenance, and specific items of repair where damage has occurred either through accident or deterioration.

Mr. FRENCH. There is some new language in the item. Will you explain the necessity for that language, "for which there may be no special appropriation available"?

Maj. GARLINGTON. The change consists in making the language identical with that in the United States, so as to make the reference of the appropriation titles to the Treasury and to the disbursing officers similar, so that the purposes of the appropriation may be better understood.

Mr. FRENCH. You have been doing the same work called for but doing it from some other appropriation?

Maj. GARLINGTON. We have been doing it under the language as written but want to put in the same language as is used in the continental United States for the sake of uniformity in the bill, and are also changing the word "torpedo", where it occurs, to "submarine mine," as explained when a similar item was up for the United States.

MAINTENANCE AND REPAIR OF SEARCHLIGHTS AND ELECTRIC LIGHT AND POWER EQUIPMENT FOR FORTIFICATIONS, PANAMA CANAL.

Mr. FRENCH. What is the justification for the next item?

Maj. GARLINGTON. The next item is for the maintenance and repair of searchlights and electric lights and power equipment for fortifications, and for tools, electrical and other supplies, and appliances to be used in their operation. The estimate submitted was \$59,000, which we have reduced to \$45,000. The reason for this large increase over the appropriation for last year is because of the

inclusion under this item of the gasoline and oil for the operation of these units, which were formerly supplied through quartermaster appropriations. It is similar to the case already explained for the continental United States and for the insular possessions.

Mr. SLEMP. Are you going to make a similar statement with regard to that item that I asked for as to the other two items?

Maj. GARLINGTON. Yes, sir; we want to make that same statement under all items of this character, wherever they occur in the bill. [See p. 135.]

Mr. SLEMP. That accounts for \$37,000 of the \$59,000, and the remaining \$22,000—

Maj. GARLINGTON (interposing). Is for the ordinary items for which there were appropriations for the fiscal year 1921.

Mr. SLEMP. That is about two and one-half times the appropriations of 1916, 1917, and 1918. You reduced the total item from \$59,000 to what amount?

Maj. GARLINGTON. To \$45,000.

Mr. SLEMP. What change does that make in spare parts and in the other items?

Maj. GARLINGTON. We reduced that with the understanding that the reduction would be applied to the amount of gasoline and oil furnished, and reduced the number of hours of operation of the plants. We want to keep the \$22,000 for the ordinary supplies and spare parts.

Mr. SLEMP. Is that just a general war reserve that you want to accumulate there?

Maj. GARLINGTON. No; we have had appropriations in the past for the war reserve, and the method of operation now is to issue each year for current needs the spare parts and repair items from the war reserve, and then with this maintenance appropriation replace them in the war reserve, so that we have no item this year for a war reserve in Panama.

Mr. SLEMP. Have you had requests from down there or is this just based on the fact that you spent this much money last year?

Maj. GARLINGTON. This is based on the detailed estimates submitted by the district engineer, and is largely built up by him on the requirements during the current year.

Mr. SLEMP. How much have you spent this fiscal year?

Maj. GARLINGTON. They are spending the entire appropriation of \$20,000.

Mr. SLEMP. In what way?

Maj. GARLINGTON. That covers the repair parts and spare parts for the 25-kilowatt sets and the spare parts for the searchlights.

Mr. SLEMP. I thought you said you were accumulating an enormous quantity of spare parts and searchlights at Schenectady. You do not have to pay the Government for those, do you?

Maj. GARLINGTON. No; that rehabilitated equipment at Schenectady can be issued against these requisitions.

Mr. SLEMP. Have you checked that in order to determine whether you have the spare parts up there that you want for Panama?

Maj. GARLINGTON. I do not think these estimates have been referred there; no, sir.

Mr. SLEMP. I wish you would give an itemization of that.

Maj. GARLINGTON. I do not believe we can do that, beyond the details of the expenditures, during the past year.

Mr. SLEMP. Then give the expenditures for the last fiscal year.

Maj. GARLINGTON. Very well.

NOTE.—No itemization found possible other than copies of all requisitions; not considered necessary to furnish these.

CONSTRUCTION OF SEA WALLS AND EMBANKMENTS.

Mr. SLEMP. The next item is for the construction of sea walls and embankments, \$405,000. This item was disallowed last year.

Maj. GARLINGTON. And is to be withdrawn this year.

PREPARATION OF PLANS FOR FORTIFICATIONS, INCLUDING SURVEYS FOR ROADS, CANAL ZONE.

Mr. SLEMP. The next item is for the preparation of plans for the fortifications and other works of defense, including surveys for roads, Canal Zone, \$3,000. Have you anything to say on that item?

Maj. GARLINGTON. Yes, sir. That is an item for detailed plans for new work for which there is no specific appropriation available. It is a corresponding figure to the one for the Hawaiian Islands.

Mr. SLEMP. I would not think any special appropriation was necessary for that purpose. You have a Governor there who is a military officer.

Maj. GARLINGTON. But the money he has under his control is not applicable to fortification work.

Mr. SLEMP. You have always gotten along without the use of this item, and why do you introduce it when the fortifications are pretty well completed?

Maj. GARLINGTON. Because of the fact that they have gone into a revision of those defenses down there and want to draw up plans and estimates to submit to Congress for installing 16-inch armament at both ends of the canal.

Mr. SLEMP. What does your statement there show about it?

Maj. GARLINGTON. This estimate is submitted in order to provide funds from which can be paid the cost of the preparation of plans for fortification construction work at the Panama Canal in advance of the appropriation of funds therefor. Under the provisions of the fortifications appropriation act, approved February 13, 1913, estimates for engineer construction work in connection with the fortifications are not to be submitted to Congress until after plans and estimates of costs have been prepared. The preparation of these plans and estimates is ordinarily chargeable to the appropriation from which the cost of construction work covered by such plans and estimates is paid; in the absence of funds under the general appropriations plans and estimates can not be prepared, and it is to meet such conditions that the funds covered by the 1922 estimate are required.

Mr. SLEMP. Why did you not have an item of that kind heretofore in this bill?

Maj. GARLINGTON. I think that at the time the money was appropriated originally for the present defenses of the canal they started off in that way.

Mr. SLEMP. I know, but it has been eight years since 1913.

Maj. GARLINGTON. But now we are going to submit in the next fiscal year new plans for 16-inch armament down there at Taboga and at the Atlantic end of the canal.

Mr. SLEMP. Did you do any work of this kind during the last eight years?

Maj. GARLINGTON. The preparation of new plans?

Mr. SLEMP. Yes.

Maj. GARLINGTON. We did; yes, sir; but we had money available under gun and mortar battery appropriations during those years. Now, then, we are not asking for any money for gun and mortar batteries at Panama for next year, yet we want to submit estimates the following year for gun and mortar batteries, and we would not have any money to pay for the plans unless we had this item to which to charge it.

Maj. BROWN. Prior to last year the funds were available until expended, and then you probably used small balances.

Maj. GARLINGTON. That is the idea; yes; but at the end of this fiscal year we will have exhausted all gun and mortar battery funds, and they will revert to the Treasury at the end of the fiscal year, yet we want to submit plans for some more gun and mortar batteries.

Mr. SLEMP. What sort of a force will that \$3,000 take care of?

Maj. GARLINGTON. It will only apply for the part-time services of the draftsmen, who are now employed under other appropriations for carrying on other work.

Mr. SLEMP. The major part of the money necessary to prepare those plans will have to be paid out of another appropriation, anyway?

Maj. GARLINGTON. It should not be, sir.

Mr. SLEMP. Three thousand dollars would not be enough.

Maj. GARLINGTON. It ought to be enough just for the actual drafting.

Mr. SLEMP. Surveying, plans, etc.?

Maj. GARLINGTON. Yes. The territory where these batteries are to go has been pretty well covered by surveys, and this will be the use of that information and drawing up the new drawings for the new batteries.

Mr. SLEMP. What is your itemization of the \$3,000?

Maj. GARLINGTON. It has not been itemized.

Mr. SLEMP. Then it is really a guess? That is what it comes down to?

Maj. GARLINGTON. It is an approximate figure, to be consistent with that we are asking for the Hawaiian Islands.

Mr. SLEMP. That is the basis of it?

Maj. GARLINGTON. Yes, sir.

Mr. SLEMP. You do not know what you are going to do with it; you do not know what type of men you are going to employ, whether you are going to employ draftsmen, engineers, or surveyors?

Maj. GARLINGTON. Yes, sir; it will be—

Mr. SLEMP (interposing). You can not do all of that with \$3,000.

Maj. GARLINGTON. No, sir; but the work of the preparation of the drawings that is chargeable to this appropriation can be taken care of by it.

Mr. SLEMP. Of course, if you can not itemize it specifically your information is not very definite.

Maj. GARLINGTON. Perhaps I do not make it clear, sir, but the preliminary studies for this——

Mr. SLEMP (interposing). What I am trying to get at is the specific use you are going to make of this \$3,000, what kind of men you are going to employ, whether they are to be engineers, draftsmen, or surveyors, and whether the money is to be used to pay for maps, etc. Do you know specifically, or do you just assume, that since the estimate is \$3,000 it must be that much?

Maj. GARLINGTON. Of course, it is, in a measure, based on my experience as to how these things are handled.

Mr. SLEMP. That is what I thought. Somebody down there sent you an estimate of \$3,000 without any explanation of it, and you are trying, from your experience, to justify it.

Maj. GARLINGTON. I think not. This item was inserted in the office of the Chief of Engineers because we realized we would not have the funds for gun and mortar batteries after the close of the fiscal year, and we knew that the War Department was planning to come to Congress the following fiscal year with a project for 16-inch armament down there, and we thought that this figure would be sufficient to cover the completion of those studies which are already under way.

PURCHASE AND INSTALLATION OF SEARCHLIGHTS, SEACOAST FORTIFICATIONS, CANAL ZONE.

Mr. SLEMP. The next item is for the purchase and installation of searchlights for the seacoast fortifications on the Canal Zone, \$12,250. You did not have any money for that purpose last year?

Maj. GARLINGTON. No, sir. The basis of the estimate of \$12,250 was \$6,250 to cover the construction of concrete operating platforms for the 60-inch searchlights, Nos. 1, 2, and 3, at the coast defenses of Cristobal, on the Atlantic side. At present these lights have operating platforms of wood projecting over a bluff; these wooden platforms rot rapidly and there is danger of serious injury to the operators of the searchlights should the platforms give out at any time. This item was asked for last year, but no appropriation was made, so that the condition of the present platforms is that much worse now, and we are trying again to get the necessary funds to make the substitution.

Mr. SLEMP. How old are those platforms?

Maj. GARLINGTON. They were built when I was on duty in the Canal Zone, some time between 1913 and 1916; I think some time in the early part of 1916 or latter part of 1915.

Mr. SLEMP. Are all of our other searchlights on concrete platforms?

Maj. GARLINGTON. No, sir; they are not all on concrete platforms, but these are built in front of the shelters of the searchlights, right on the edge of very steep earth banks. A searchlight is run out from its shelter on a track which ends right at the top of the bluff, and these wooden platforms are really overhanging balconies, which

enable the men to get around in front of the lights and clean the mirrors or operate the lights.

Mr. SLEMP. What would be the difference between the cost of a wooden platform and a concrete platform?

Maj. GARLINGTON. A wooden one would cost about one-third the cost of a concrete platform.

Mr. SLEMP. The other item is for shelters.

Maj. GARLINGTON. Yes; and is to be withdrawn, so as to reduce this estimate to just the \$6,250.

Mr. SLEMP. The next item—not mentioning those that are to be omitted—is for the purchase or reclamation of land required for the defenses of the Panama Canal, \$108,000.

WEDNESDAY, FEBRUARY 9, 1921.

COAST ARTILLERY CORPS.

STATEMENTS OF MAJ. GEN. FRANK W. COE, CHIEF OF COAST ARTILLERY, AND MAJ. GEORGE RUHLEN, COAST ARTILLERY CORPS.

CONSTRUCTION OF FIRE-CONTROL STATIONS AND ACCESSORIES AT FORTIFICATIONS IN THE UNITED STATES.

Mr. SLEMP. For the construction of fire-control stations and accessories, etc., you had appropriated last year \$770,000, and you are asking for \$728,180. You returned out of the appropriation for last year \$1,367,008. Will you explain the nature of your balances under the appropriation of \$770,000, how that money was expended this year, and then explain the estimates for next year?

Gen. COE. The allotments made by the Chief of Coast Artillery to the various departments from the appropriation for the fiscal year ending June 30, 1921, are as follows: To the Chief of Engineers, \$545,778; to the Chief Signal Officer, \$153,250; to the Chief of Ordnance, \$17,460; for subaqueous sound-range finding, \$4,000, making a total of \$720,488, and leaving a balance of \$49,512.

Mr. SLEMP. Do you expect to utilize that balance during the rest of this fiscal year?

Gen. COE. We will probably utilize that entire balance. The general object of these allotments and what the allotments have been spent for can probably be better given by Maj. Garlington, or we can put in this statement [indicating]. This is a complete statement furnished by the engineers.

Mr. SLEMP. This statement covers items at Portland, Portsmouth, Boston, New Bedford, etc.?

Gen. COE. Yes, sir.

Allotments for expenditures for fire-control purposes made from fire-control appropriations by Chief of Engineers.

Coast defenses of:

Portland, Me.....	\$28,777.82
Portsmouth.....	2,500.00
Boston.....	32,650.00
New Bedford.....	2,500.00

Coast defenses of—Continued.

Narragansett Bay	\$41,300.00
Long Island Sound	5,500.00
Sandy Hook	18,250.00
Delaware River	41,417.13
Baltimore	2,000.00
Chesapeake Bay	21,835.50
Cape Fear	12,689.49
Charleston	29,100.00
Savannah	3,000.00
Key West	9,200.00
Tampa	4,750.00
Pensacola	21,340.00
Mobile	1,000.00
Galveston	67,330.00
San Diego	3,237.74
Los Angeles	8,277.14
San Francisco	11,777.00
Columbia River	6,350.00
Puget Sound	2,630.00

SUPPLY SECTION.

Procurement of equipment	\$21,250.00
Blue-print paper for radio-dynamic torpedo unit, Boston	1,000.00
Allotments for expenditure for fire-control purposes made from fire-control appropriations by chief of ordnance:	
Experimental work on coincident range finders 40 per cent of total amount used from this appropriation	5,000
Grills for eighty 3-inch 15-pounder and twenty-five 75 mm. anti-aircraft guns	12,460
Total	17,460

Allotments for expenditure for fire-control purposes made from fire-control appropriations by chief signal officer: Cable, time-interval panel, retardation coils, gun telephone, battery commander's telephone, gun battery fire-control telephones, pot-head wire, wiping solder, conduits, voltmeters, zone signal controllers, zone signal bells, switch keys, terminal boxes, terminal strips, distributing frames, condensers, time-interval bells, signal bells, zone signals, fire-control hand sets, fire-control head sets, cut-out switch boxes, etc., for installation at the following coast defenses: Boston, Charleston, Delaware, Galveston, Mobile, Narragansett Bay, New Bedford, Portland (Me.), Sandy Hook, San Francisco, and Tampa	100,000
Material supplied to coast defenses of Boston, Charleston, Chesapeake Bay, Columbia, Delaware, Galveston, Mobile, Key West, Narragansett Bay, Portland (Me.), Portsmouth, Sandy Hook, Tampa	45,000
Electrical transmission devices	5,000
Radio antennae	1,750
Jack panels	1,500
Total	153,250

Mr. SLEMP. Let me ask you a few questions: The fire-control proposition for all batteries and guns under 12 inches and also for the 12-inch mortars is completely worked out, as I understand it?

Gen. COE. For the 12-inch guns, except those that we have referred to as the long-range 12-inch guns.

Mr. SLEMP. There were about 24 of them?

Gen. COE. Thirty-two altogether.

Mr. SLEMP. Installed within the last two years?

Gen. COE. Yes, sir.

Mr. SLEMP. Is nearly all of this money that you are spending during this fiscal year being expended upon those 12-inch long-range guns?

Gen. COE. Yes, sir; the larger items are.

Mr. SLEMP. Do I understand that the estimates for the coming fiscal year will be sufficient to complete the fire-control installation for all 12-inch long-range gun batteries?

Gen. COE. The present estimates cover everything, except in two cases. The total estimate for the long-range batteries at Portland was \$54,500, of which we ask \$34,500. The fire-control project for the Hog Island battery will remain unfinished at the end of this year.

Mr. SLEMP. How much will you need to finish it?

Gen. COE. The revised estimate is \$85,500 on those batteries, but I do not think that will complete them. When our subaqueous sound range-finding apparatus comes through we will probably utilize some of it at that point. It is a very difficult place at which to provide any system of fire control, on account of the withdrawn position of the batteries.

Mr. ANTHONY. Does this appropriation cover absolutely new fire-control installations at those points or an improvement of existing installations?

Gen. COE. I think there are very few items there for the improvement of existing stations. We are leaving them as they are in practically all cases. In a good many cases that have come up this year where we had money which was available for improving old stations, I have declined to recommend the use of the money for that purpose, believing that we could get along with them as they were and that all fire-control funds that we ask for—or practically all—should be devoted to new projects or to the 16-inch long-range batteries.

Mr. SLEMP. What amount of money are you expending this year on 16-inch gun emplacements? Out of the \$770,000 you are supposed to spend some money on that project this year, on the 25 per cent basis.

Gen. COE. We have spent some at the Fort Michie battery.

Mr. SLEMP. What is the average cost of fire-control installation for the 12-inch batteries, or have you any way of estimating the average cost?

Gen. COE. I can not give the average cost, but possibly the Engineers could.

Maj. GARLINGTON. We have not the average cost, because the problem is so different in each locality, and it is necessary, of course, to equip the stations with the length of cable necessary to reach the points at which they can observe the areas covered by the batteries, and those areas differ at different places.

Mr. SLEMP. In connection with this estimate of \$728,000 for next year, I notice that you are working on 16-inch guns at Boston, Fort Michie, and southern New York. You are beginning the 16-inch gun proposition at those places?

Gen. COE. Yes, sir.

Mr. SLEMP. We will not have any guns in there for Boston for a good while.

Gen. COE. We are building the batteries now at Boston.

Mr. SLEMP. What about southern New York?

Gen. COE. For southern New York, we will begin the construction this year, and, in fact, the construction has really begun. They are simply to be gun blocks at Fort Tilden.

Mr. SLEMP. Your fire-control estimate for Boston is \$120,000, for Long Island Sound, \$70,000; and for Fort Tilden, \$120,000. All of those are war-time costs, are they not?

Maj. GARLINGTON. We have reduced these items materially in accordance with what we think we can spend this year.

Mr. SLEMP. That is 25 per cent.

Gen. COE. Yes, sir; 25 per cent for southern New York. The \$17,250 for Long Island Sound is for completion. For Boston it is 25 per cent, \$31,250.

Mr. SLEMP. And southern New York is the same way.

Gen. COE. Southern New York is the same.

Mr. SLEMP. General, do you regard this estimate of \$728,180 for next year as altogether an A item?

Gen. COE. No, sir; I would regard not more than \$500,000 of that as an A item.

Mr. SLEMP. What do you eliminate then from the \$728,180.

Gen. COE. We would drop out everything at New Bedford.

Mr. SLEMP. Is your fire-control proposition at New Bedford complete?

Gen. COE. No, sir; it is not, for the 12-inch guns; but the cost in our opinion is prohibitive.

Mr. SLEMP. Then how are you going to operate the guns.

Gen. COE. We feel that they must operate the guns as far as they are used in peace times by improvised means. In war time they will have to occupy the sites which are necessary.

PURCHASE OF LAND.

Mr. SLEMP. These items involve very nearly \$50,000 for acquiring land alone?

Gen. COE. Yes, sir. The land up there is too expensive to purchase; besides, those guns are not of primary importance.

Mr. ANTHONY. Do you regard the New Bedford district as of primary importance?

Gen. COE. The general area in which the New Bedford district is located we regard as of the greatest importance of any on the Atlantic coast; that is, the area which might be bounded on the outside by Montauk Point, Block Island, and Martha's Vineyard, but the guns at New Bedford are regarded as on the inner line although they protect a very important anchorage place.

Mr. SLEMP. The guns would not shoot over Martha's Vineyard.

Mr. ANTHONY. The only way an enemy could get up to Buzzard's Bay would be to pass around Block Island.

Gen. COE. Yes, sir. Of course, the channel from Block Island to Martha's Vineyard is very wide. It is over 30 miles.

Mr. SLEMP. That is why I said that these 12-inch guns would not shoot across it.

Mr. ANTHONY. Have you ever considered the idea of placing defenses on Block Island?

Gen. COE. That subject has been considered.

Mr. SLEMP. We would like to have you state the general idea as to your policy in regard to the defenses.

Gen. COE. As a matter of actual fact, with what we propose there, I do not think the guns at New Bedford are of any real importance. As it stands right now, they might be, but we can put in there in a very short time an improvised fire-control system to handle them.

Mr. SLEMP. What other items do you leave out to reduce this to \$500,000?

Gen. COE. At San Francisco the protection of plotting room and B C station, Battery Godfrey, \$5,382, and protecting plotting, Battery Saffold, \$7,350. In order to bring the remainder down to \$500,000 we have not eliminated any specific items, but we will simply express our opinion that we can get along with that amount of money.

SUBAQUEOUS, SOUND, AND FLASH RANGING APPARATUS.

Mr. SLEMP. For subaqueous sound ranging you ask \$167,000, and you only asked for \$10,000 last year, if I remember correctly.

Gen. COE. Yes, sir; but we have spent more money than that. We had left over or under contract last year from war funds about \$120,000, as I remember it, for the purchase of subaqueous sound-ranging apparatus, and we are developing that with some prospects of success. I do not undertake to state yet that it will be successful, but it looks as if it is the most promising line of investigation we have for determining ranges up to 50,000 yards, when the vessels are beyond vision from the shore.

Mr. SLEMP. Explain now what the principle of that is.

Gen. COE. The principle might be shown perhaps by these drawings. For example, if we have here a sound-listening apparatus, say, 2,000 yards apart, connected by means of electrical apparatus, if a vessel in this area is making a noise the direction from which that noise reaches this point (A) can be determined; and in the same way, when the noise made by the same vessel reaches this point (B) can be determined.

Mr. SLEMP. That is, the second point?

Gen. COE. Yes, sir. Now, also by an electrical apparatus, the range and the direction of the vessel can be determined. We know that the operation I have described is perfectly practicable. What we are working on is to perfect the apparatus so that the angle of the direction will be determined with greater and greater accuracy, and we are getting, as I say, fairly satisfactory results by so doing.

Mr. SLEMP. The vessel making the noise, that would be recorded simultaneously at those two points?

Gen. COE. Yes, sir. It gives you the base and two angles. You have your base line, which you know is the distance between the two apparatus. You get one angle from each base end. It is exactly the same principle as sighting with a telescope from two ends of a base line.

Mr. SLEMP. And you are able to record that?

Gen. COE. Yes, sir.

Mr. FRENCH. It is the same principle used in locating ships by wireless which is being practiced to-day.

Gen. COE. It is the same principle exactly. You solve the triangle in any location work and you do the same thing in the wireless directional system.

Mr. FRENCH. They have that pretty well perfected, have they not?

Gen. COE. Very well perfected, Mr. French. These sets are installed all along our coast and are used by the Navy and by commercial vessels, but of course in that case they do not care whether they determine the position of a vessel within 100 yards or 1,000 yards or two or three miles. They simply want to know the general location of the vessel. The accuracy of determination by that means is not at all sufficient for our purposes.

Mr. FRENCH. Is the direction from which sound may come more accurately determined than the wireless message?

Gen. COE. Yes, sir; at the present time it is very much more accurately determined. It is determined by the fact that sound waves reach the ears of the listener and if the apparatus is turned a little way from the normal, in the direction from which the sound is coming, he gets a certain interference there which he is able to detect, so he is able to direct his hearing apparatus very accurately by means of his ear toward the point from which the sound comes.

Mr. SLEMP. These receivers are down under the water; how is the connection made between them?

Gen. COE. They are electrically connected in this case, as indicated on this chart, to an operating station or some other point on the shore.

Mr. SLEMP. What practical demonstration have you had of the success of the apparatus?

Gen. COE. In the first place, the Navy Department installed certain apparatus of a like nature at Long Island Sound during the war. After the war was over it was agreed between the Secretary of War and the Secretary of the Navy that the entire sound-ranging business would be turned over to the War Department, and the Coast Artillery took over all their apparatus and we also have acquired apparatus since which was purchased under a contract to which I have already referred. We have that now installed, some of it at Boston and some of it at Long Island Sound, in the coast defenses there, and we are carrying on daily tests and operations.

Mr. SLEMP. That accounts for your initial expenditure of \$120,000, and you are making these experiments now, what is the necessity for expending \$160,000 for more of the same kind of material?

Gen. COE. Because the apparatus is being developed all the time. It is purely in the experimental stage yet, and I can not tell you exactly what we expect to spend the \$167,000 we are asking for. We have a good many of the best engineers in the country working on that subject. Col. Abernathy, who is in charge of the development of the Hammond radio-controlled torpedo, is also in charge of the subaqueous sound ranging work with headquarters in Boston, and the estimate of \$167,000 is as follows: Miscellaneous purchases, \$10,000; retaining the services of one consulting specialist, Dr. G. W. Pierce, \$5,000; maintenance and repair of present installation, \$15,000; compensators, \$20,000; hydrophone station, \$10,000; listening and plotting rooms, \$5,000; shore station apparatus, \$2,000; cable, 24-conductor, \$100,000; total, \$167,000.

Mr. SLEMP. Have you any personal knowledge of the need of that money yourself, General?

Gen. COE. I have personal knowledge of frequent reports from Col. Abernathy as to the success of that work and I have talked with him frequently. He comes to Washington for conferences on the subject and his statements to me lead me to believe it is the best line of investigation we have at the present time for solving that problem.

Mr. SLEMP. Have you had his reports submitted to any recognized board appointed by you for investigation and report?

Gen. COE. No, sir; there is no board that could express an opinion which would be anything like or equally of as much value as the opinion of Col. Abernathy.

Mr. SLEMP. You personally have not investigated the matter more than to receive his reports?

Gen. COE. No; I can not say I have, except I have talked with him.

REPLACING OBSOLETE RADIO EQUIPMENT IN COAST DEFENSES.

Mr. SLEMP. For replacing obsolete radio equipment in coast defenses you are asking \$75,000. Has this any relation to airplanes?

Gen. COE. It is for communicating with airplanes.

Mr. SLEMP. I believe the information in reference to that has been given us.

General, take the Charleston, Galveston, and Sandy Hook items, I would not say there is any need of money at either one of those places. You have improvised systems already for firing the batteries at each one of those places.

Gen. COE. At Galveston I think there is need for some additional work, for the reason that we have no way of handling the four long-range guns which we have installed there unless we get up in the air in some way so we can see out to sea, because the country around there is so flat. At Charleston I would not expect to do any work. I think that that work at Sandy Hook is necessary at some time. It is necessary in order to utilize the armament of long-range guns which is there.

Mr. SLEMP. How have you been getting along up to the present time?

Gen. COE. They have just been completed.

Mr. SLEMP. Not all of them.

Gen. COE. Those four long-range guns.

Mr. SLEMP. When were they taken over by the Coast Artillery?

Maj. GARLINGTON. They have been occupied by the artillery for six or eight months, and the formal transfer is to take place some time next month.

Mr. SLEMP. I thought you were always in advance of the occupancy so far as the fire-control installations were concerned.

Gen. COE. No, sir; we are not in this case. That statement is not always correct.

Maj. GARLINGTON. That is particularly so because of the prohibition against the acquisition of real estate with money appropriated for the Military Establishment. The land is needed and we had the money two years ago, but we were not able to spend it for real estate, so the whole project was held up.

Mr. SLEMP. Is this \$93,150 for the purchase of land?

Maj. GARLINGTON. The revised figure for the purchase of the land is \$81,000.

Mr. SLEMP. How much land are you going to get for that amount?

Maj. GARLINGTON. Eighteen and one-half acres for \$76,000, which is \$4,000 an acre, and for contingencies, such as having abstracts of title and other legal matters attended to, \$5,000, or a total of \$81,000.

Gen. COE. The project for the fire control of those batteries has been under consideration ever since I came to the office, and it is a very difficult problem, and I do not know of any way to solve it except in this way.

Mr. SLEMP. Those batteries are 12-inch batteries altogether?

Gen. COE. Yes, sir.

Mr. SLEMP. Do you not have any improvised system of fire control there at all by which you now fire those batteries?

Gen. COE. No improvised system which will cover the ranges of the batteries. We are not concerned with the inner zones, because they are covered by the existing armaments and by existing fire-control systems completely. So the value of the batteries lies in their use in the zone from 12,000 yards to 27,000 yards, and that zone we have no means of covering.

Mr. SLEMP. If you had balloons there up in the air, would that solve your fire-control proposition for you?

Gen. COE. We have tried to design instruments to use in balloons to solve the fire-control problem, and there are some that are being manufactured now which we will test out in the course of the next 12 months, but I am very doubtful about their effectiveness. We have not been able to use them satisfactorily so far. Of course, for the observation of fire, they are very important and very valuable, but to establish the primary relation of the distance from the gun to the target, and to maintain it, we have not been able to use them. Suppose, for example, we had a base line and for some reason or other, say our powder was all right, we were shooting continuously at a target but going 500 yards over it. Then the balloon would at once detect that and the fire could be corrected by that constant error, but we can not use the balloons to establish the distance to the target and to keep continually the range from the gun to the target as the target moves. We can not use the balloon for that purpose.

Mr. SLEMP. Is that because of its lack of stability?

Gen. COE. Yes, sir; lack of stability from two standpoints; first, it is not a fixed point in the air, so we have not a fixed base line. It drifts around if it is up some hundreds of yards; and, second, the difficulty of observing from the basket of a balloon which is weaving around in the air. We have carried on experiments trying to do that and plotting the positions of the balloons from fixed stations on the ground, utilizing in that way a variable base line, as it were.

Mr. SLEMP. General, how are you going to solve the fire-control proposition beyond the range of visibility?

Gen. COE. As I have said, the subaqueous sound ranging seems to be the most promising means. Of course, the range of the 12-inch long-range gun frequently is not beyond the range of visibility at

30,000 yards. It is, of course, beyond the range of visibility under certain conditions of weather.

Mr. SLEMP. We are now going along with these expensive fire-control installations for the 16-inch batteries, when 40,000 yards is 15,000 yards beyond the range of visibility. Do you not think we had better hold up on the expenditure of that money?

Gen. COE. No, Mr. Slemp; not for the 16-inch batteries, and not for anything we have proposed. We know we must have some stations situated as best they may be for the control of those guns, no matter what means finally come in. If we should get to the point where we use subaqueous sound ranging, we would still provide—for as powerful guns as the 16-inch guns—stations on shore which would control them in case the target came within 25,000 yards. Of course we have always got this situation: When a target is invisible, due to the weather conditions, from any place on the shore, the shore itself is invisible from the target.

Mr. ANTHONY. How do you conduct your target practice there at these long ranges?

Gen. COE. We do not conduct target practice with the long-range guns, like the 12-inch long range, except at ranges we can see. We have held practice up as high as 25,000 yards at San Francisco, but of course, we have good heights out there.

Mr. ANTHONY. And you could do that because your guns are high.

Gen. COE. The guns are high and the observation stations are high. At Sandy Hook we have great difficulty and that is why we have to buy this land at Navesink Highlands, and we can get no height there now except at Navesink Highlands.

Mr. ANTHONY. So it is impossible for you to even hold target practice at ranges over 15,000 to 25,000 yards.

Gen. COE. We can frequently hold target practice at 25,000 yards.

Mr. ANTHONY. I mean at Sandy Hook.

Gen. COE. At Sandy Hook we could not unless we got up on the high ground.

Mr. ANTHONY. And without this appropriation you can not get up on the high ground.

Gen. COE. We can not, except with the permission of the owners to go in there and occupy their ground. We did that during the war.

Mr. SLEMP. What is the area of land the Government owns at Sandy Hook?

Gen. COE. One thousand three hundred and sixty-six acres.

Mr. SLEMP. How far from the land we own now is Navesink Highlands?

Gen. COE. About a mile and a quarter from the guns.

Mr. SLEMP. What is the elevation of that tract of 18½ acres?

Gen. COE. Two hundred and sixty feet.

Mr. SLEMP. Does that 260 feet add substantially to your range?

Gen. COE. Two hundred and sixty feet will give you the water line of a battleship at 25,000 yards so that the whole ship is in view.

Mr. SLEMP. If you put up a vertical tower of 260 feet, would that cost more than the purchase of this Government property if it was put on Government land?

Gen. COE. I do not know whether that could be done for that money or not. Probably Maj. Garlington can answer; but there is a serious

objection to that, and that is it becomes at once a very marked and vulnerable target, while on the slopes of the hill our stations—and we put up several of them there—are all concealed and would not at any rate draw the enemy's attention.

Maj. GARLINGTON. One thing further is that we are putting two towers at the north end of the base line on the Government reservation, but the southern end of the reservation is masked by Navesink Highlands; we go up there and will put the station there to give the necessary view to the south and southeast. Towers are already used at one end of the base line.

Gen. COE. But not as high as 260 feet.

Maj. GARLINGTON. No, sir; they are about 65 feet, I think.

USE OF AIRPLANES FOR FIRE CONTROL.

Mr. SLEMP. General, right in that connection, I would like to ask what your conclusions are about the use of airplanes for fire control?

Gen. COE. Again, if we can get some means of establishing the relation between the gun and the target which may have an error in it, but which can be considered as a constant, then the airplane, as well as the balloon, is very valuable for correcting the fire.

Mr. SLEMP. You regard the airplane and the balloon as purely an observation of fire proposition?

Gen. COE. Yes, sir.

Mr. SLEMP. By which you would correct the firing of the gun as established by your fire-control system?

Gen. COE. Yes, sir.

Mr. ANTHONY. And you can not figure the range from the airplane because you do not know the height of the plane?

Gen. COE. We do not know the height of the plane and we can not locate it exactly. We have tried without success this plan—to have the airplane go over the target in foggy weather.

Mr. SLEMP. And drop a certain colored light?

Gen. COE. Yes; and also to emit radio signals, and we can get the general direction of the target all right, but we can not accurately locate the target sufficiently to open fire on it by those means. We have the airplane circle over the vessel and whenever it is directly over the target send out radio waves and we locate it just as we do the ships at sea, but that is not accurate enough.

Mr. SLEMP. General, the other day we were discussing the question of the substitution of radio telephony or telegraphy for these expensive cable systems, and you stated that the question was one of interference, and that afternoon I noticed at Pittsburgh a company is now ready to put in 3,000,000 radio phones.

Gen. COE. Where did you get that, Mr. Slemp?

Mr. SLEMP. In the Times.

Gen. COE. That is quite possible, but we do not know anything about any such proposition or anything like that that we could handle. It may be so. I refuse to deny anything along that line.

Mr. SLEMP. And that was for an area around Pittsburgh of 3,000,000 square miles.

Gen. COE. I am rather skeptical about that.

Mr. SLEMP. I mention that just to show that the proposition is getting commercialized and that the Army is not keeping up with it.

Gen. COE. I am rather skeptical of that, Mr. Chairman; I doubt if that is correct.

Mr. SLEMP. This seems like a lot of money. In 1912 and 1913 you got along with \$100,000, and in 1914 and 1915 you did not get anything at all, you only asked for \$25,000 in 1915.

Gen. COE. Our expenses under fire control during the last few years have been largely in connection with the new batteries which we put in and they are now largely in connection with the new 16-inch batteries which we are putting in. We must have lines of communication to control those guns, otherwise the guns have no value.

Mr. SLEMP. I think you must have spent a lot of money on batteries under the 16-inch guns, else, with this money you would have had all the 12-inch gun work completed. That undoubtedly must have been the case.

Gen. COE. Do you mean the last year?

Mr. SLEMP. In 1918 when you had \$3,755,000 you returned a little bit less than half. That must have been expended on the standardizing of fire control?

Gen. COE. Some of that was done during the war and the year after the war we spent money on projects which had not had any development for years.

MAINTENANCE OF COAST ARTILLERY WAR INSTRUCTION—MATÉRIEL AT COAST ARTILLERY POSTS.

Mr. SLEMP. The next item is, "For maintenance of Coast Artillery war-instruction matériel at Coast Artillery posts, including necessary material and labor therefor," you are asking \$1,500. That is a normal appropriation that goes to Fort Monroe?

Maj. RUHLEN. The funds are disbursed there. The estimate is for ship models, lantern slides, pamphlets, etc.

Mr. SLEMP. Do you need that money, General?

Gen. COE. I should like to have some appropriation carried there. We estimate that \$1,200 will be sufficient.

CONSTRUCTION OF FIRE CONTROL STATIONS AND ACCESSORIES, INSULAR POSSESSIONS.

Mr. SLEMP. For the fire-control proposition in the Philippine Islands you are asking \$135,000 and in the Hawaiian Islands \$59,850, a total of \$194,000. Can you reduce that?

Gen. COE. We have reduced that somewhat.

Mr. SLEMP. How much can that be reduced?

Gen. COE. The estimate for the Hawaiian Islands we have reduced to \$2,500, just for fire control, and for the Philippine Islands \$12,000.

Mr. SLEMP. Please put in the record your situation as to the expenditure of the \$175,000 for the fiscal year—what you have done and the situation there with regard to the operation of the fire control.

Gen. COE. Yes, sir.

Allotments made from the appropriation fire control in insular possessions, 1921 to—

Chief of Engineers.....	\$98,072.00
Chief Signal Officer.....	67,207.85
Chief of Ordnance	560.00
Total.....	165,839.85

Balance on hand, \$9,160.15. All of this balance will have been expended by the end of the fiscal year.

Allotments made to the Chief of Engineer were for expenditures on the following:

Installation of fire control for 12-inch battery, Ohua Point.....	\$15,000.00
Switchboard room, Fort Ruger.....	9,900.00
Post telephone system, Fort Ruger.....	8,000.00
Switchboard room, Fort Kamehameha.....	1,422.00
Cable for Fort Kamehameha.....	3,500.00
Fire-control installation for 12-inch and 14-inch batteries at Manila...	36,000.00
Protection switchboard room, Fort Frank.....	11,000.00
Lighting fire-control stations.....	2,000.00
Sanitary installations in switchboard room, Fort Mills.....	250.00
Bombproofing plotting room, Battery Morrison.....	10,000.00
Fire-control material.....	2,600.00

Allotments made to the Chief Signal Officer were for expenditure on the following:

Cable and material, Hawaiian Islands.....	\$3,364.00
Material and cables, 12-inch long-range battery, Manila.....	41,500.00
Cable materials for fire control 14-inch batteries, Manila.....	20,180.85
Emergency fire-control equipment for Manila.....	2,063.00

Allotment made to the Chief of Ordnance was for expenditure on the following:

Modifying 110° plotting boards.....	\$560.00
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Mr. SLEMP. Generally speaking, you can operate the batteries as they are now with the present fire control?

Gen. COE. Yes, sir.

Mr. SLEMP. You are not asking for any money for the proposed batteries in the Hawaiian Islands?

Gen. COE. No, sir; because we can submit that later.

Mr. SLEMP. What is your method of fire control for the railway artillery you have sent to the Philippine Islands and the Hawaiian Islands?

Gen. COE. We have sent none to the Philippine Islands, but some to the Hawaiian Islands.

Mr. SLEMP. The 240-milimeter guns that you are sending to the Philippines, have they their own mounts?

Gen. COE. Yes, sir.

Mr. SLEMP. How do you get the fire control?

Gen. COE. In the case of Manila we expect to put that armament right into the existing fire-control system and probably we will have to make some extensions to that. We have had some reports from there which ask for great extensions. We have disapproved those and sent them back, stating that the problems must be restudied so as to bring them within a much smaller figure. As a matter of fact, we believe that probably the guns can be handled with the present fire-control installation, with a small extension. It may be that after further study we will bring in a comparatively small item for controlling these guns.

Mr. SLEMP. The reason for having the mobile guns—they went to different places from where the batteries are?

Gen. COE. Not in the Philippines. They all went to Corregidor Island; that is the central point there.

Mr. SLEMP. In that case you could not command the landing of a force from any other point?

Gen. COE. Yes, sir. There are no defenses on the mainland in the Philippines. They are all on the string of islands that run across the entrance to Manila Bay, the largest one being Corregidor itself, and that is where all the armament you speak of goes.

Mr. SLEMP. The \$135,000 originally estimated was to take care of the 240-millimeter guns?

Gen. COE. Not for the existing batteries. The \$135,000 was for improving the fire-control installation of the permanent batteries. It included the items of \$12,000 for the 12 and 14 inch batteries, the extension of the conduit system, for the post telephone system. I might say in passing that with regard to a place like Corregidor the present telephone system is a part of the fire-control system.

Mr. SLEMP. That is, it really serves the convenience of the entire garrison?

Gen. COE. Protection of Fort Hughes switchboard room, \$32,500; fire control, antiaircraft-gun project, \$27,000; Signal Corps equipment, \$23,000; those are the larger items in the estimate as submitted.

The 155-millimeter guns and the 240-millimeter howitzers, that is new mobile armament that is being sent out there. Of course, we can not bring the antiaircraft guns into the fire-control system, because they fire in the air and not over the water. Our fire-control system is designed only for firing over the water. We did not feel that the project as submitted was satisfactory, and we are working on the development of the control of gunfire at aircraft now. It may be that we will get some better method than at present.

Mr. SLEMP. As to your method of shooting antiaircraft guns, what is the fire control with reference to that?

Gen. COE. This was a very elaborate project.

Mr. SLEMP. Speaking generally, what system do you adopt? Here is an airplane in the air and an antiaircraft gun shooting at it.

Gen. COE. There are two methods of fire control, both of which are very technical.

Mr. SLEMP. You do not use the antiaircraft guns in the coast defenses?

Gen. COE. We have distributed them to the coast defenses, but we do not use them very much. We have a battery of antiaircraft artillery at Fort Monroe which is giving their entire attention to the development of the apparatus and to the best means of controlling fire against aircraft. They actually fire down there against an airplane. They set the airplane to work, but instead of sending up the deflection which will make the projectile hit the airplane, they aim directly at it, but let it fly at the distance that it will travel during the time it takes the projectile to reach that point, so there is a constant stage that the observer in the airplane becomes familiar with; that is, the projectile bursts so much behind the airplane, say, it is 500 yards that he travels while the projectile is traveling up to the point where it bursts. In that way he can observe the bursting of the shell in the air, just as a man on a towboat can observe the splash on the surface of the water.

Mr. SLEMP. That matter is not far from being solved?

Gen. COE. It is not nearly as far from being solved as the long-range fire control.

Mr. ANTHONY. That is on the same principle of shooting a duck in the air—you have to lead it?

Gen. COE. Exactly; you have to lead it. You have to take into consideration the time of the flight of your projectile and have to cut your fuse before you put it into the gun. There have been various inventions for setting the fuse electrically in the gun after loading. Of course, the last instant you can do that if it is desirable to do it. We have not thought that they would be satisfactory.

Mr. SLEMP. Then there is the difficulty of telling from the ground the difference between an aeroplane which is 15,000 feet or 20,000 feet in the air?

Gen. COE. We determine the height by instrumental observations, just the same as we figure it on the sea.

Mr. SLEMP. You have range finders with most of the guns like those in the Field Artillery service?

Gen. COE. The range finder for the Coast Artillery is part of the fire control.

Mr. SLEMP. Suppose you have a gun on a railway mount or on a tractor and you want to fire it at some point, have you not mechanical apparatus?

Gen. COE. No, sir; we do not provide the self-contained range finder for that armament, because the target is never seen from the gun, only from the air. We do provide for the smaller armament the self-contained range finder that you speak of.

CONSTRUCTION OF FIRE-CONTROL STATIONS, INCLUDING PURCHASE OF LANDS AND RIGHTS OF WAY, ETC., PANAMA CANAL.

Mr. SLEMP. For the Panama Canal you are asking \$46,471. Did you spend all of the money appropriated last year?

Maj. RUHLEN. We have not spent all of it yet.

Allotments made from the fire-control appropriation for expenditure in Panama Canal:

Chief of Engineers.....	\$200,000
Chief Signal Officer.....	120,830
Total.....	320,830

Allotments made to the Chief of Engineers were for expenditure on the following:

Fire-control battery, Shagres Battery.....	\$100,000
C. R. F. stations, Atlantic side.....	8,170
Datum point, Atlantic side.....	3,000
Restoration switchboard room, Fort Sherman.....	13,500
Radio signal station, Fort Sherman.....	12,000
Radio equipment, Fort Sherman.....	9,178
Instrument lighting outlying stations.....	370
C. R. F. stations, Pacific side.....	8,170
Instrument lighting, Batele.....	148
Laying cable, Perno Islands.....	448
Laying cable, Flamenco Islands.....	3,751
Equipment radio station, Fort Grant.....	9,178
Switchboard cable, Naos Islands and Flamenco Islands.....	9,378
Fire-control equipment.....	795

Allotments made to the Chief Signal Officer were for expenditure on the following:

Cable, instruments, etc., Shagres River Battery.....	\$119,330
Jack panels.....	1,500

Maj. GARLINGTON. The appropriation is to be expended almost entirely under the Engineer Department and, perhaps, I can answer some of the questions. The amount appropriated last year was expected to complete all of the fire-control work for the batteries now on the Canal Zone, but we have found that that estimate was too optimistic and that there is about \$26,471 worth of the work which we will not be able to do with the appropriation. In other words, that means an increase of \$26,471. There is another item of \$20,000 in the estimate for the redistribution of the base lines for the coast defense of Cristobal, which is to put in additional apparatus and switchboard rooms which will enable the existing stations to be interconnected in various combinations so as to get all of the waters covered in the best manner for any one of the batteries.

Mr. SLEMP. Have you one of those fire-control stations at Taboga Island?

Maj. GARLINGTON. We have two small stations on Taboga Island on the Pacific side.

Mr. SLEMP. Is this bunk house to be used in connection with those stations?

Maj. GARLINGTON. That would provide barracks for the detachment which will have to remain on the island.

Mr. SLEMP. Have you anything there now?

Maj. GARLINGTON. No structure. If they are living there, it is in tents.

Mr. SLEMP. The same way as at Fort Sherman?

Maj. GARLINGTON. They probably go to that station from the post at present. Those first items, completing coincidence range finder stations, bunk house at Taboga, bunk house for signal station, Fort Sherman, completing datum points are hangovers from last year.

Mr. SLEMP. They are actual facilities rather than parts of the fire-control system?

Maj. GARLINGTON. The range-finder stations are absolutely essential to the fire-control system.

Mr. SLEMP. Why not put them in first and leave the others until later?

Maj. GARLINGTON. We shall not have that work completed by June 30th.

Mr. SLEMP. Will you have any balance left over?

Maj. GARLINGTON. We expect to spend all the money before the end of the year and have that work left undone.

Mr. SLEMP. What about the new language?

Maj. RUHLEN. That is, to make the language for the fire-control appropriation in Panama read the same as it does for the United States and insular possessions, to have uniformity.

Mr. SLEMP. If you have completed the fire-control project at Panama you would be indifferent to the language?

Maj. RUHLEN. Probably there will be something more.

Mr. SLEMP. This involves the purchase of lands and rights of way, the purchase and installation of necessary lines and means of electrical communications, including telephones, dial and other telegraphs, etc.—the possibilities are so large under that item that it would seem

to me you would not want to go into that until the necessity for it arose.

Maj. RUHLEN. If it is not advisable to make a change the language carried last year is satisfactory.

SUBMARINE MINE MATÉRIEL, UNITED STATES.

Mr. SLEMP. General, you have submitted two items in connection with submarine mines, one for purchase, manufacture, and test of submarine mine matériel "and the other for maintenance of submarine mine matériel," etc?

Gen. COE. Yes, sir.

Mr. SLEMP. For the first item you are asking \$10,000 and for the second item \$116,100?

Gen. COE. We have spent no money under submarine mines C for 1921.

Mr. SLEMP. You really do not need the \$10,000?

Gen. COE. Yes, sir; we shall spend it before the end of the year for target practice. The \$10,000 item is the usual item for target practice.

Mr. SLEMP. Please put in the record the amount you have spent?

Maj. RUHLEN. Yes, sir; we shall do that in every case.

Submarine mines—C.

To be expended prior to the close of the fiscal year June 30, 1921..... \$9,233

For the following:

Mine transformers.....	2,800
Explosives	2,470
Towing ropes, bolts, nails, paints, small materials, etc.....	1,569

Gen. COE. As to the submarine mines, B, I will ask Maj. Ruhlen to give you the balance.

Maj. RUHLEN. The balance on hand December 31, 1920, was \$40,202.08. It is expected that all of the balance will be spent by the end of the fiscal year. This appropriation is used to maintain the torpedo depot at Fort Totten, N. Y., the payment of salaries and wages, office supplies, materials used around the depot and for the maintenance of submarine mine matériel within the continental limits of the United States.

Appropriation, "Submarine mines, 1921-B."

Object of expenditure.	Expended July 1- Nov. 30, 1920.	Estimated expendi- tures for balance of fiscal year.
Salaries and wages.....	\$3,790.82	\$7,302.18
Stationery, drafting supplies, etc.....	66.98	223.02
Cloth, rope, etc.....	508.88	7,401.12
Hardware.....	541.92	3,458.06
Metal in castings, forgings, and shapes.....	706.79	2,293.21
Lumber.....		4,000.00
Electrical material and supplies.....	3,156.07	4,843.03
Acids, glass, etc.....	8.25	491.75
Oils.....		800.00
Paint.....		5,400.00
Miscellaneous.....	24.00	2,978.00
Services, nonpersonal.....	80.75	2,919.25
Total.....	8,974.46	41,925.54

Mr. SLEMP. How many depots have you for the submarine mine matériel?

Gen. COE. We have only one, at Fort Totten, N. Y.

Mr. SLEMP. That is a reserve center, is it?

Gen. COE. Yes, sir.

Mr. SLEMP. At other places along the coast involved in your mine projects, you keep at those stations supplies for the particular mine fields?

Gen. COE. Yes, sir.

Mr. SLEMP. If I understood you last year, you said that we were well equipped to mine the waters that should be agreed upon to be mined as an existing artillery project, that you were equipped with anchors, buoys, cables, boats, etc.?

Gen. COE. We are completely equipped for all of the projects, as I stated last year, with certain exceptions.

MAINTENANCE OF SUBMARINE MINE AND NET MATERIAL, UNITED STATES,
AND PURCHASE OF MACHINERY, TOOLS, ETC., FOR TORPEDO DEPOT, FORT
TOTTEN, N. Y.

Mr. SLEMP. I notice that you ask for \$116,000 under B; can not that be reduced?

Gen. COE. We have reduced that to \$75,000.

Mr. SLEMP. What item would you cut out?

Gen. COE. We have reduced the item for submarine mine cables from \$81,000 to \$45,000.

Mr. SLEMP. How will you divide it?

Gen. COE. About proportional to the figures for 1-conductor and 19-conductor cables. This is a maintenance item.

Mr. SLEMP. You do not use any of this submarine mine matériel, you are not planting any mines?

Gen. COE. We survey all of our cable every year. We classify it into serviceable and unserviceable. This is to replace the cable which becomes unserviceable during the year. Our estimate was that the cable would last 20 years, and we started out to maintain the cable by estimating for 5 per cent every year, but, of course, we have now a good deal of cable that is comparatively new, so that deterioration has not begun to spread itself over the 20 years, if that is a correct estimate, and we do not feel that it is necessary at this time to appropriate for the whole amount.

Mr. SLEMP. Seventy-five thousand dollars is a larger amount than you have normally received?

Gen. COE. That is less than 5 per cent of the cost of our cable material.

Mr. FRENCH. When was the cable installed?

Gen. COE. It was bought, Mr. French, beginning as far back as 1905—further back than that—but considerable portions were bought out of war funds, which brought our submarine-mine system fully up to date. So I do not feel that we need to spread out over 20 years at exactly 5 per cent each year in replacement.

Mr. FRENCH. What I had in mind was that although the depreciation would be 5 per cent it would not fall on any part of the cable but

would spread itself out, so that it might be economy to replace a large amount at some time and less now.

Gen. COE. I think that is true, although I do not believe that the cable will stand up uniformly the same length of time in different places. In some places it will stand up well and in other places it goes down more quickly. In the Philippine Islands we have great difficulty in maintaining the cable. After consultation with the very best authorities on cable storage in the country, we have changed our method of storing it in the last two years. We now store it in a dry place instead of under water; we stored it under water for a long time, but we think we are getting better results from dry storage.

Mr. SLEMP. Does this take care of the storage at the various sea-coast units?

Gen. COE. Well, there is practically no expense attached to the storage, because the storehouses have been constructed already and the maintenance of the cable in the storehouses is performed by Coast Artillery troops. So there is no item for maintenance in that respect.

Mr. SLEMP. Most of this is for acids, chemicals, glass, electrical material and supplies, hardware, metals in castings, forgings, and shapes, oils, paint, pitch, resin, tar, varnish, stationery, drafting and office supplies, twine, cloth, rope, lumber, etc.

Gen. COE. That is for the maintenance of the materials.

MAINTENANCE OF SUBMARINE-MINE MATERIAL IN INSULAR POSSESSIONS.

Mr. SLEMP. Your next item is for maintenance of the submarine-mine material in the insular possessions, \$19,500.

Gen. COE. We can reduce that, as far as the purchase of cable goes, in the same proportion, making the total of the item \$13,500, a reduction of \$6,000.

Mr. SLEMP. How did you make out last year, when you had \$6,530? Did you get through on that money?

Gen. COE. As none of the amount appropriated for the fiscal year 1921 was used for the purchase of cable it was sufficient for current needs.

Appropriation. "submarine mines in insular possessions, 1921-B."

Object of expenditure.	Expended July 1- Nov. 30, 1920.	Estimated expendi- tures for balance of fiscal year.
Stationery, drafting supplies, etc.....		\$50.00
Cloth, rope, textiles, thread, etc.....		1,000.00
Hardware.....		1,000.00
Metals in castings, forgings, and shapes.....	\$434.56	1,565.44
Lumber and timber.....		500.00
Electrical supplies.....	156.20	843.80
Acids, glass, etc.....		200.00
Oils.....		300.00
Paint, pitch, resin, tar, varnish, etc.....		400.00
Miscellaneous.....		180.00
Total.....	590.76	5,939.24

ALTERATION, MAINTENANCE, AND REPAIR OF MINE MATÉRIEL, PANAMA CANAL.

Mr. SLEMP. Your next item is under the Panama Canal, for alteration, maintenance, and repair of submarine mine matériel. You had \$4,138, and you want \$13,000 next year.

Appropriation, "Submarine mines, Panama Canal, 1921-B."

Object of expenditure.	Expended July 1- Nov. 30, 1920.	Estimated expendi- tures for balance of fiscal year.
Stationery, drafting supplies, etc.....		\$74. 00
Cloth, rope, textiles, thread, etc.....		925. 00
Hardware.....		518. 00
Metals in castings, forgings, and shapes.....	\$12. 50	912. 50
Lumber and timber.....		148. 00
Electrical supplies.....	925. 00	
Oils.....		148. 00
Paint, pitch, resin, tar, varnish, etc.....		400. 00
Miscellaneous.....		100. 00
Services, nonpersonal.....		100. 00
Total.....	937. 50	3,200. 50

Gen. COE. We have under contract now 20 mines for the Panama Canal, which we expect to install there during the coming year.

Mr. SLEMP. Where did you get the money with which to pay for them?

Gen. COE. We got it last year; we had \$40,000 last year. It came out of previous funds. We had your authority for that, and it was for the purchase of that special type of mine. We have been working on some new mines for Long Island Sound and also Puget Sound. We have been considering some new mining questions, but we have not recommended anything.

Mr. SLEMP. Just what have you been doing at both of those places?

Gen. COE. We have planted mines in Puget Sound this year and maintained them, but with some difficulty.

Mr. SLEMP. What do you mean by saying that you have maintained them with some difficulty?

Gen. COE. Well, it means this: Any mine case that we have had so far is too small and we had to build some special cases for Puget Sound, because the current there is so swift that when it sweeps down it carries the mine with it; the buoyancy is not sufficient to maintain the mine close enough to the surface of the water to come in contact with a battleship if it should pass over it. As I say, we had to build some special mine cases for that place. Then we have had to double or treble the size of the anchors. I have in my office a report, which just came in this morning, as to those mining operations, and while I have just had time to glance at it I have gathered enough from it to know that the claim is that there is a possibility of maintaining mines there, but it is so difficult to do it that I am going to be slow in recommending it.

Mr. SLEMP. If you got the right sort of anchor and the right sort of mine to hang there it would be effective, would it not?

Gen. COE. Well, I doubt it; I doubt whether it is practicable.

Mr. SLEMP. Did the barrage that was put across the North Sea during the recent war give you any lessons from which you could draw conclusions?

Gen. COE. Not with regard to mining a place like Puget Sound, unless you go farther out into the Sound and mine a very much broader area of it; that might be a possibility.

Mr. SLEMP. That is, you could go out where the current had ceased to be so strong and mine that place?

Gen. COE. But that could not be done at any place where we could use controlled mines. Of course, you can not go too far from the shore, because you must have cable running out, and if you make an attempt to go out 10 or 15 miles, of course, the cost of the cable would run into the millions at once.

Mr. SLEMP. If American ingenuity was able to place a barrage clear across the North Sea which absolutely stopped the enemy's vessels, it surely should be possible to keep enemy vessels out of Long Island Sound and Puget Sound?

Gen. COE. Yes; I think we could keep vessels out of Long Island Sound, because the mining possibilities there are much better than they are at Puget Sound.

Mr. SLEMP. Have you the equipment for that?

Gen. COE. No, sir; that would not come under the Coast Artillery; they would be naval mines and not our mines, because the question of the cost of the cable would be too great.

Mr. SLEMP. How far do you go out from the land before the Navy takes jurisdiction?

Gen. COE. We do not measure it in that way. We say that if a mine field is to be controlled from the shore it is the function of the Coast Artillery to plant it and control it; if, however, the mine field is to be automatic, then it is a question for the Navy. They sometimes come very close together, as, for example, at the entrance to Chesapeake Bay.

Mr. FRENCH. There must be a very complete understanding in time of war between the two.

Gen. COE. Well, it is only a question of making the decision before the mining operations begin as to just who is to handle it. The Navy would sow as many mines as they please; then a buoy would be placed at the end of their mining operations and the Army would then mine across the remainder of the entrance channel. Those plans have all been drawn up and agreed upon.

Mr. SLEMP. Have the Navy and the seacoast authorities worked out that problem generally for the United States? You have your plans all agreed upon for all the approved projects?

Gen. COE. Yes, sir.

Mr. SLEMP. Do you have separate submarine mine wharves at different places?

Gen. COE. We have what we call submarine mine wharves which are used for submarine purposes to the exclusion of anything else whenever they are needed for that purpose, but they are also used for any other purpose when not needed for submarine mine work.

Mr. SLEMP. It was stated in the hearings that one of those wharves at Manila was to be repaired for the exclusive use of the submarine

mine work, and the building of another wharf at Fort Mills. You might check that up, if you do not mind.

Gen. COE. I will put a report in the record.

NOTE.—There is a submarine mine wharf at Fort Mills on the opposite side of the island from the Quartermaster and Engineer wharves, which is used for submarine mine work.

HAMMOND TORPEDO.

Mr. SLEMP. Will you make a brief statement about the Hammond torpedo, the present status of it and how you are getting along?

Gen. COE. We have completed the study of the construction of the Hammond torpedo to the point where we believe that it is possible to build the torpedo and equip it with an engine to give us an estimated speed of 35 knots. We have let a contract for the design of that engine; it is a gasoline engine of 1,600 horsepower, which is larger, by a great deal, than any engine that has ever been constructed.

Mr. SLEMP. Of any kind at all?

Gen. COE. Yes; any gasoline engine. There is always a possibility of failure, but we have felt that there was a sufficient chance of success to go ahead with it. The hull design has been carefully worked out by men whom we have specially put on that job, and by naval officers who have given us great assistance in the matter, and we do not anticipate any difficulty in that. We have not let the contract for the hull and will not do so for sometime yet. We will probably let the contract for the construction of the engine this summer. It has dragged along, but in December we had actually spent out of the \$417,000 that was available under the appropriation only about \$4,000, and to liquidate all of our obligations would not have involved more than \$20,000. I make that statement to the committee so that they will understand that we have spent all of this time in making as careful investigations as we could make as to the possibilities of the construction, and the decision was made in December to go ahead with the work. I think we will be able to complete the unit within the appropriation, but we will practically have no surplus.

Mr. SLEMP. What will it cost to make one of those engines?

Gen. COE. Our estimate of the cost of the engines is as follows: Engines and gear, \$170,000; engine tests and alterations, \$28,000; hull and accessories, \$100,000; stabilizing tests, \$18,000; auxiliaries, \$30,000; radio dynamic features, \$45,000; assembling tests, etc., \$20,000; and miscellaneous, \$6,000.

Mr. SLEMP. How deep is it proposed to have the torpedo run?

Gen. COE. The torpedo itself, which is in the bow of the vessel, will be 15 feet under water. The boat itself is the torpedo, and it is controlled from the air or from any other place. The explosive charge is right in the bow of the boat, and it is designed to carry 1,500 pounds of explosive.

Mr. SLEMP. This submarine runs at 35 miles an hour?

Gen. COE. And runs right into the side of a battleship, under its own power.

Mr. SLEMP. And then explodes?

Gen. COE. No; it does not let it out at all; it simply runs right into the battleship.

Mr. FRENCH. It destroys the object which it meets?

Gen. COE. Yes, sir.

Mr. SLEMP. That is what I thought, except that I had this idea: I thought that a vessel discharged the torpedo.

Gen. COE. No. The Shearer boat, which has been designed and launched recently, carries three torpedoes, and is somewhat similar to the Hammond, but there is at least one man, and possibly two men in the Shearer boat, and that discharges a torpedo.

Mr. SLEMP. And will that torpedo have its own engine?

Gen. COE. That torpedo will probably be the Navy torpedo with compressed air in it.

Mr. FRENCH. How near does that boat reach the object of attack before it discharges the torpedo?

Gen. COE. It need not get any closer than the range of the torpedo, and that is at present, I think, 20,000 yards. Of course, it is not worth while to launch a single torpedo at 20,000 yards, but if you have a fleet formation and there are a lot of destroyers firing 50 torpedoes at once, then they might utilize that range of 20,000 yards. I think that is the maximum of the Navy torpedo now. The instructions to the German submarine commanders, I have seen it stated, were not to fire at a vessel unless they got within 500 yards. I do not know that those were the instructions, but I have seen that statement.

Mr. SLEMP. How would an observer direct the torpedo when it was 15 feet under water?

Gen. COE. There is an air intake pipe which sticks up out of the water, and the trail of the torpedo boat in the water could be followed.

Mr. SLEMP. Then it would be open to the fire of torpedo destroyers, bombs, etc.?

Gen. COE. The air intake pipe would be; yes. Mr. Hammond contemplates having a reserve air supply which will carry it a short distance even if the air intake pipe is shot away.

Mr. SLEMP. In order to control it from the land or some other point it would be necessary to see the wake of the torpedo?

Gen. COE. Yes, sir.

Mr. SLEMP. And that, of course, would advise the enemy of the approach of the torpedo?

Gen. COE. Yes, sir; the enemy is bound to be aware of it.

Mr. SLEMP. Do you expect that engine to be completed some time within the next fiscal year?

Gen. COE. Yes, sir; I think that torpedo boat will be completed within that time.

Mr. SLEMP. And probably within the next fiscal year some experiments can be made with that unit?

Gen. COE. Yes, sir.

Mr. EAGAN. What is the horsepower of that engine?

Gen. COE. One thousand six hundred horsepower; there are two engines, each developing 1,600 horsepower, as I remember it.

Mr. EAGAN. Last year you were skeptical as to whether you could build an engine of such power.

Gen. COE. Yes, we were; and we did not make the decision until December.

Mr. EAGAN. But now you are satisfied it can be done?

Gen. COE. We are satisfied that the engine can be built and turn over, as we call it, but whether it will run we are not positive. We are taking certain chances on that.

Mr. FRENCH. You have not gotten to the point where you could estimate costs, assuming that it is a success?

Gen. COE. That estimate was previously placed by Mr. Hammond at \$50,000 per torpedo, but I think it will run higher than that in the end, although it might not if you make a large number, and as weapons of defense they would only be of value if made in considerable numbers. The Naval War College has taken a considerable interest in the Hammond radio-controlled torpedo and have carried out several war maneuvers on their maneuver board which are indicative of the fact that if they were in existence to-day they would have a considerable effect upon naval operations.

ORIGIN OF FORTIFICATION PROJECTS.

Mr. SLEMP. Who originates a fortification project? Where does it start?

Gen. COE. Well, in the case of the continental United States fortification projects for the defense, say, of New York City are instigated, or supposed to be instigated, in the first instance by the corps area commander; that is his responsibility. However, the rules and regulations of the War Department say that either the Engineer Department or the Coast Artillery have a perfect right to initiate any measures which they think are necessary for the defense of the country. In the case of ———, that is outside of anybody's immediate jurisdiction except that of the Navy Department, and I suppose it will probably come from them, and would be brought before the Joint Army and Navy War Planning Committee, which sits continuously.

Mr. SLEMP. I would like to have you submit a statement which would connect up the War Plans Division propositions with the Board of Review's projects so that we may be clear that whatever we are doing is backed by competent authority in the War Department.

Gen. COE. Do you mean to say that you would like to have me take the Board of Review project as it was last formulated?

Mr. SLEMP. Yes. The Board of Review, as I understand, has been supplanted by the War Plans Division, and I would like to have you give the attitude of the War Plans Division toward our defenses, so that the committee may connect itself up in its appropriation work with existing war bodies that are passing on these questions.

Gen. COE. Of course, the Board of Review project in its entirety included a good many guns, 16-inch howitzers, at least, for which estimates have never been presented to Congress, as far as I know.

Mr. SLEMP. I think that is true.

Gen. COE. And I do not think it is the intention to ever carry out those projects.

Mr. SLEMP. My idea was to try to bring the propositions up to date, and I think it would relieve you very much to have them brought up to date.

Is that all you have, General?

ALLOCATION OF 16-INCH GUNS.

Gen. COE. That is all, except in regard to this letter of the Secretary of War and the question of the allocation of the 16-inch guns. We have under construction eighteen 16-inch guns and twelve 16-inch howitzers. The Secretary of War has submitted to the chairman of the committee a confidential letter in which he recognizes that the following order of priority should govern the completion of the projects now pending. That order is very different from the order in which they were appropriated for. I feel that it is very essential that the committee should understand that situation and realize the fact that otherwise we would be putting guns in places where we would not desire to put them.

RAILROAD ARTILLERY.

Mr. SLEMP. General, what is your general conclusion now as to the use of railroad artillery and the supplanting of guns on fixed emplacements by guns on railroad mounts?

Gen. COE. We have no information to give the committee in addition to what we had last year on that subject when you gave us an appropriation to complete one railroad carriage for a 14-inch gun and to start three. That carriage will not be completed before the end of this fiscal year.

Mr. SLEMP. You have nearly 300 guns in the railroad artillery service, have you not?

Gen. COE. No, sir; there are about 175 actually mounted on railroad mounts. That includes the 8-inch, 10-inch, 12-inch, and 12-inch mortars.

Mr. SLEMP. You are keeping a large part of this matériel at Camp Eustis, are you not?

Gen. COE. Yes, sir.

Mr. EAGAN. The 14-inch gun is the largest that you can use on a railroad mount, is it not?

Gen. COE. It is the largest that we have mounted on a railroad carriage. We have mounted one 16-inch howitzer on a railroad carriage.

Mr. SLEMP. Do you propose to do a lot of experimental and development work, so far as the seacoast defenses are concerned, in connection with railroad artillery, or have you anything to state to the committee in regard to the results of what has been done at Camp Eustis?

Gen. COE. It is very important to provide a place for railroad artillery where they can have access to both land and water ranges, and Camp Eustis, Va., is the only site that we have where we can get these facilities. We have about 175 guns mounted on railroad mounts, and we have four regiments of Artillery assigned to the use of that equipment. They are all stationed at Camp Eustis, Va. We

will later on send one battalion to Hawaii, where they will operate on the railroad that runs around that island. They will have only the smaller calibers there. The heaviest gun or the 14-inch gun can be utilized in assisting in the defense of the coast line from Portland, Me., to Chesapeake Bay on the Atlantic coast and also on the west coast. The 14-inch gun can not go over some of the southern roads on account of the light bridge construction and the lack of clearance facilities, but we can utilize any of the lighter guns, from the 8-inch to the 12-inch guns, on those roads. That mass of artillery constitutes a very important reserve of artillery for use in assisting in the defense of the coast.

Mr. EAGAN. You can not transport the 14-inch guns to points along the coast where you want to use them?

Gen. COE. We can not on some of the southern roads.

Mr. EAGAN. Could you carry them there by boats?

Gen. COE. No, sir; we could not do that very well. We could send them there, perhaps, by taking the gun off the carriage and sending the carriage and then the gun, but it detracts very largely from their mobility, because you would have to remount the gun on its carriage.

Mr. FRENCH. The railroads are bringing their bridges and tunnels up to a standard where these guns and mounts can be accommodated, are they not?

Gen. COE. Yes, sir; they are improving their bridges. They ran down a good deal during the war.

Mr. SLEMP. Last year you called attention to a chart that you had classifying all the railroads of the country.

Gen. COE. We sent some railroad guns up to the Northeastern Department, or to the First Corps Area, with headquarters at Boston. We sent them to Camp Devens, and they stayed there with the mobile troops. We then sent them to Provincetown, at the end of Cape Cod, and then around to Rockport, Mass., in the northeast corner of Massachusetts, where they had some target practice. There are railroads which run all along on both sides of Boston Harbor, where we can send guns of all calibers.

Mr. SLEMP. Do you see any special necessity for having a central point for this Railroad Artillery?

Gen. COE. Yes, sir; it is absolutely essential. First, we must have a place where we can train the personnel assigned to that armament, both on land and water ranges. Any attempt to distribute it all along the seacoast would be quite impossible from the training standpoint, and it would also be impossible from the physical standpoint, because all of our forts have been acquired with the idea in view of getting just as little land as we could. There are no facilities available anywhere on the Atlantic coast or the Pacific coast belonging to the United States that are suitable for training ground.

Mr. SLEMP. You are sending some railroad artillery to the Hawaiian Islands.

Gen. COE. Yes, sir.

Mr. SLEMP. You have those guns there on their mounts, and they will be under the jurisdiction of your seacoast officers?

Gen. COE. Yes, sir.

Mr. SLEMP. That is a case where you have distributed them.

Gen. COE. We had to do that or else put in some other kind of guns.

Mr. SLEMP. Suppose you were to send some to the Northeastern Division, would not the commander of the Northeastern Division give training to the men in the use of those guns and give them the same experience in firing them there that you would give them at a central camp?

Gen. COE. But he has no place to accommodate any large amount of that artillery on ground owned by the Government. That would mean either the renting or purchasing of ground by the Government in order to establish a center there. I think it would not be at all an impossibility to establish a center for railroad artillery for each corps area which comes in contact with the coast line, but it would be an expensive thing to do. Here at Camp Eustis, so far as training and strategical considerations are concerned, we have the best place in the country.

Mr. SLEMP. When you speak of training, do you mean training with individual guns or training in tactical organizations?

Gen. COE. I mean training in tactical organizations or batteries.

Mr. SLEMP. That could not be done with dispersed guns?

Gen. COE. No, sir. The fire control for the Railroad Artillery is basically the same for any other heavy Artillery, but practically there are a great many difficulties connected with it, because it is movable and we have to arrange to get it into places and to occupy stations, the location of which has to be determined rapidly but accurately—that is, the judgment as to what places should be occupied as stations. All of those matters are things which require a great deal of training and very careful training. It is not, as you might say, a cut-and-dried question, as it is in the coast defense.

RECOMMENDATION OF CAMP EUSTIS AS TRAINING CENTER.

Mr. SLEMP. You strongly favor the preservation of Camp Eustis as a training center?

Gen. COE. If it is not retained, I do not know what we can do with our Railroad Artillery. I think there will be absolutely nothing to do but put it out of commission, and I believe that it is of such value to the country that it should not be relegated to the storage house.

Mr. SLEMP. So far as I have been able to see, there has not been any reflection from the introduction or accumulation of this railroad matériel in the way of reducing the number of guns in our fortifications for which emplacements are to be provided.

Gen. COE. I think it is, for this reason: That if the Board of Review project was well considered, and I think it was, the determination not to carry it out, I think, is based very largely on the use of the railroad artillery when it comes along. Of course, I can only speak for myself, but I know that that has been the effect upon my mind, and the officers of the Army and Navy who are studying these projects know and the department commanders know that a certain amount of railroad artillery is available for their use, and that other matériel will be coming along, and in studying their projects they anticipate this. Certain mounts are allotted definitely to each corps commander already, with the understanding that if the money is avail-

able they will be sent to him at any time he wants it, either for maneuvers or actual use.

Mr. SLEMP. If all the railroad artillery were sent to the various corps areas, you would not have any left at Camp Eustis.

Gen. COE. It would depend upon whether we allotted all of it. We have not allotted all of it to the corps commanders, but we have some in reserve that might be sent there.

Mr. SLEMP. That reserve is what you do the training with at Camp Eustis?

Gen. COE. No, sir; we keep all of it at Camp Eustis for training purposes. It is allotted subject to their call.

Mr. SLEMP. They then use it a little while and return it to Camp Eustis?

Gen. COE. Yes, sir; just as we did when we used it in the maneuvers at Provincetown and Rockport.

Mr. SLEMP. They sent those guns back to Camp Eustis?

Gen. COE. Yes, sir. We sent a 12-inch gun down to Pensacola that fired against the battleship *Massachusetts*.

MONDAY, FEBRUARY 7, 1921.

SIGNAL CORPS.

REPLACING OBSOLETE RADIO EQUIPMENT IN COAST DEFENSES.

STATEMENTS OF MAJ. J. O. MAUBORGNE, CAPT. JAMES G. ANTHONY, AND CAPT. A. BLISS ALBRO, SIGNAL CORPS, UNITED STATES ARMY, AND MAJ. GEORGE RUHLEN, COAST ARTILLERY CORPS.

Maj. RUHLEN. Mr. Chairman, we have an item under fire control, "Replacing obsolete radio equipment in coast defenses." and Maj. Mauborgne, of the Signal Corps, is here. We have asked him to represent us on the technical features of that equipment and to show you the necessity for replacing that we have on hand.

Mr. SLEMP. You want to make a statement on the general necessity for the use of radio instruments in your fire-control operations?

Maj. RUHLEN. Yes, sir; and replacing what we have and enlarging upon the installations.

Mr. SLEMP. This is in connection with the item on page 8 of the bill, under the Chief of Coast Artillery, for the construction of fire-control stations and accessories.

Maj. MAUBORGNE. Mr. Chairman, I understand that a question has arisen about the propriety of using in the coast defenses certain radio sets developed for the Army in the field. I refer specifically to the loop radio set S. C. R. 77, which I understand has been referred to in questions on the fortifications bill, and I understand that my testimony last year before the Senate Appropriations Committee with reference to this particular loop type of radio set has been quoted in this matter. I am not familiar with the testimony given or the questions asked, but I have arrived at the idea that it was believed by members of the committee that this loop radio set was a telephone set, or a radio telephone set.

Mr. SLEMP. No; I did not think so.

Maj. MAUBORGNE. I see.

Mr. SLEMP. By the way, I mentioned that it was your testimony before the Senate committee that we were referring to, and you now say that you are not familiar with it.

Maj. MAUBORGNE. Oh, no; I meant to say that I was unfamiliar with the testimony given before this present committee this year. I was referring to the testimony given this year.

Mr. SLEMP. Let me see if I can clear the situation for you: I read over your testimony before the Senate committee in regard to communication without the use of underground wires or long antennæ, and I asked the Chief of Coast Artillery if he had tried out the radio proposition suggested by you as a possible substitute for the fire control now in use, with its very expensive cable connections, or its communication by cable.

Maj. MAUBORGNE. Yes, sir. I believe that the committee might be interested in seeing a photograph of the loop radio set referred to in my testimony last year before the Senate committee. This set, which is a telegraphic set, has recently been tested at Fort Sill under the most adverse conditions and has given excellent results. The distance test showed that two similar sets would work with each other at a distance of 5 miles. The set is capable of nine different adjustments of wave lengths, which means that within the given range of wave lengths encompassed by the set—that is, from 74 to 76 meters—we can work only nine sets in the same net without interference. Now, the problem of Coast Artillery has rather changed its aspect so far as the technical use of radio telegraphy is concerned since the end of the recent war, and on account of the development of fire-control work with airplanes. This is really a development of the use of airplane control of fire provided for the long-range railroad artillery in France. Our artillery friends are very much in favor of using radio telephones, wherever they can, instead of radio telegraphy. I think I might digress for a moment to the subject of radio telephony versus radio telegraphy and the interference as between the two. Briefly, with a set of a given power, or with a certain input, one can work three times as far with a given transmitter arranged for telegraphy as he can by using the voice.

Mr. SLEMP. Which would mean that you would have only 1½ miles with your voice?

Maj. MAUBORGNE. Or you would have three times that much with the same set used as a telegraph set.

Mr. SLEMP. I mean by taking 5 miles as the limit of the telegraph service.

Maj. MAUBORGNE. Yes, sir. Now, with a telegraph set and a certain range of wave lengths, a great many more stations can be worked within that range of wave lengths than can be worked with radio telephone sets covering the same range. Let me illustrate: With a radio telegraph set of certain wave-length range, it might be possible to secure immunity from interference when working with a difference of wave length of 3 per cent, whereas using the same sets telephonically, 5 per cent is about the best that you could expect to get; hence in one case we might have 10 telegraph conversations, whereas, roughly speaking, you might get only 5 or 6 telephone conversations using the same set.

That, of course, depends upon the wave lengths used. The point is that there is a so-called carrier current sent out, and when you talk into the transmitter and modulate that carrier current you cause a wave, or, rather, you cause the frequency of the carrier wave in the antenna to be expanded so that you occupy a greater band of wave lengths than you do if you simply make and break the circuit with a key. For example, with a carrier current having a frequency of 10,000 modulated by radiotelephony, you will find that you occupy a band 5,000 cycles wide, or 2,500 cycles on either side of that frequency as a center. The point I am trying to bring out is that the number of simultaneous conversations you can employ with radiotelephony are far more limited than those you can have with the same set from the telegraphic standpoint. However, in using radiotelegraphy there comes the trouble, first of all, of training operators to use the telegraph key to transmit messages rapidly and to give the kind of information that the Coast Artillery wants from its base end station to its plotting room. As you know, the wire system now employed consists of having these base end stations connected by means of wires with the plotting room, and at the end of the base line the observer reads with a telescope the azimuth of the target and both observers report the results of their readings to the plotting room, where it is plotted, and from those observations the range of the vessel can be determined. If those results have to be transmitted telegraphically instead of telephonically it takes more time.

Mr. SLEMP. By wireless telegraphy?

Maj. MAUBORGNE. Or by wire telegraphy, too. It would take more time to report it by telegraph than by telephone. Hence, the Coast Artillery naturally runs a radio telephony, because they do not have to train people to talk, whereas they do have to train operators. Of course, there still remains the training of the technical expert who must take care of the set. It is like your big central telephone equipment here. You can not have that plant kept up without maintenance men.

Mr. SLEMP. You are connected with the Air Service?

Maj. MAUBORGNE. No, sir; with the Signal Corps. My particular job is with the Research and Development Division of the Signal Corps. That is a technical division that develops signal apparatus for the various branches of the service.

Mr. SLEMP. Your method of providing fire control for the 14-inch and 16-inch gun is through radio telephones or telegraph instruments by the air?

Maj. MAUBORGNE. Yes, sir.

Mr. SLEMP. By air ships or balloons?

Maj. MAUBORGNE. Yes, sir.

Mr. SLEMP. And necessarily wires are eliminated there.

Maj. MAUBORGNE. At the longer ranges; yes, sir; or until the target reaches a range so close to the station that the base end telescopes begin to play a part.

Mr. SLEMP. If you can communicate by these two methods from the air—that is, either by wireless telegraph or wireless telephone—why could you not do it on the ground without the use of cables?

Maj. MAUBORGNE. It can be done; but we must consider the whole radio situation in the vicinity of the coast defense.

Mr. SLEMP. Would you advise that being done?

Maj. MAUBORGNE. No, sir.

Mr. SLEMP. Why?

Maj. MAUBORGNE. To answer that will take a study of what radio is proposed in the most modern system for the control of fire at long range. At the end of the war, or, to be exact, in July of last year, there was a meeting held in the office of the Chief Signal Officer, at which were present representatives from the Office of the Chief of Coast Artillery, the Air Service, and the Signal Corps.

The problem before the meeting was to determine what method must now be proposed and what apparatus must be developed with a view to getting accurate fire from the heaviest guns on targets beyond the range of visibility from the fortifications. It involved a study of existing radio apparatus both on planes and in the present coast defenses. You must know that the radio stations in the coast defenses of the United States during the past 12 or 13 years have been equipped with the old spark type of apparatus which was considered satisfactory for them in the days before the past war, and usually there was only one radio telegraph station set up in a coast defense. The object of that station was usually to provide communication with the tugboat drawing the target during target practice, and with mine planters engaged in setting mines in the vicinity of the fortification. It had practically no further function. In the majority of cases it was a one-fourth kilowatt spark set having a range of about 25 miles, and in some of the larger coast defenses there was a one kilowatt set of the old spark type. For the purpose of getting a little longer range of communication with those vessels the larger sets were installed, and, incidentally, of course those bigger stations were charged with the duty of watching for S O S calls in their vicinity.

Going to the subject of the fire control use of radio, it developed at this meeting of which I was speaking a minute ago that there now appeared to be no way of getting the location of a target beyond the range of visibility from the guns. The question arose as to whether we had apparatus to do it. In the land defenses, it was obvious that a suitable radio station did not exist for that purpose, but the Air Service has one set of spark radio apparatus which can accomplish a range of about 50 miles, and that might be used at the aeroplane end of the communication system.

Mr. SLEMP. Do you contend that through the use of radio telephone or telegraph that you can give fire control to these larger guns, the 14 and 16 inch guns, by placing the radio equipment on airplanes and airships?

Maj. MAUBORGNE. Yes, sir.

Mr. SLEMP. Effectively and efficiently, can you not?

Maj. MAUBORGNE. We can do it effectively.

Mr. SLEMP. You contend, however, that if those stations are on the ground that you can not do it effectively or efficiently by the use of the radio apparatus, but must have double wires?

Maj. MAUBORGNE. Yes, sir; but it is confused with this question, that, due to the fact that there is more necessary radio communication which must take place in the air, you can not put more radio

stations in the same vicinity without interfering with your whole plan.

Mr. SLEMP. The proposition resolves itself down into this, that if on the ground there is more radio interference than if in the air?

Maj. MAUBORGNE. No, sir.

Mr. SLEMP. That is not very sound.

Maj. MAUBORGNE. That is not my proposition. My statement is this, that certain stations are necessary in the air and it is proposed to have at least three planes operating in a single coast defense. One of those planes will carry a staff officer who goes out at the stage of the battle where the Navy is fighting the incoming fleet. He reports to the coast defense commander by radiotelephone just exactly what is going on out there. One radiotelephone set in the air is on the aeroplane and another within the fortifications on the ground. When the target gets closer in so that the Army's necessities are paramount to the Navy's, then two other planes go out over a particular target and one of them carries an apparatus which is constantly making dots. There are two goniometric (angle measuring) radio sets on shore watching the movements of the planes. These sets are placed at the end of a base line. They watch the plane as it goes up and as it goes over the target to indicate the position of the target. There is also a plane that goes up for the purpose of telling the battery commanders on shore whether the shots fall over or fall short or to the right or to the left. Then, there are a number of planes which go up—

Mr. SLEMP (interposing). Is it your contention that you have to have these wires on the ground in order to give them perfect fire control or have you gotten to the point that you can begin the substitution of this radiotelephone and telegraph for these wires? I should like to have you answer yes or no.

Maj. MAUBORGNE. We have not gotten to the point where we can substitute the radiotelephone on the ground for these wires, for several reasons.

Mr. SLEMP. Just give those, please?

Maj. MAUBORGNE. Yes, sir. First, too many other radio sets would be working at the same time to warrant placing any more radiotelephone stations within the coast defense district. That is paragraph one. Two, that secrecy of communication is obtained by wires where it can not be obtained by radiotelephone unless you code what you are saying.

Mr. SLEMP. And third?

Maj. MAUBORGNE. Really, the principal reason is summed up in this statement, which applies to the use of the radio communication everywhere within the Army, that you should use radio communication only where you can not use wire communication. That is an axiomatic statement, developed as a result of the war. But in other words, you should reserve radio for communication which can not be covered by wire, so as to give the radio service which must be employed as much immunity from interference as possible.

Mr. SLEMP. Addressing yourself to the item of \$75,000, what have you to say?

Maj. MAUBORGNE. I might say this, that the first radio set which the Coast Artillery wants to purchase, to replace the obsolete apparatus now in use, as laid down in their table which will be pre-

sented to you, as a radio telephone set having a range of from 100 to 400 miles. The limit they placed on range of the set was 50 miles, but the S. C. R. 132 set, which we have developed for this purpose, has proved efficient to over 400 miles using the telephone and about 1,000 miles when used as a telegraph transmitter.

Mr. SLEMP. How much does it cost?

Maj. MAUBORGNE. Three thousand dollars.

Mr. SLEMP. Where is it made?

Maj. MAUBORGNE. We have not placed any orders yet. The set is still in the developmental stage. That is our estimate of what the set will cost. One of those will go into each coast defense. This may be a matter of interest, perhaps, to the committee. It is proposed to communicate with any point within the coast defense by talking over the ordinary telephone line through the central telephone station; then through the centrally, or possibly remotely, placed ground radio telephone set to the airplane—that is a recent development—so that the coast-defense commander may be at any point when the action starts and may get into instant communication with the staff officer in the air.

Mr. SLEMP. How many of those do you want?

Maj. MAUBORGNE. We are asking for 11 this year.

Mr. SLEMP. That takes \$33,000 of the \$75,000?

Maj. MAUBORGNE. Yes, sir.

Mr. SLEMP. What are the other items?

Maj. MAUBORGNE. The other items are for providing radio communication within certain districts laid down in the table which the Chief of Coast Artillery will present. First, there is requested a type of radio telephone or telegraph set which has a shorter range than the one just described. Its purpose is to provide intercommunication within the coast defense and with the airplane that does the spotting of the shots. The distribution of these radio stations has been worked out on the table which is to be furnished to the committee. These stations cost in the neighborhood of \$1,300 apiece, complete. The number requested in this estimate is 26.

Mr. SLEMP. Does that take up the \$75,000?

Maj. MAUBORGNE. No, sir. There is also to be provided a receiving set only that is capable of only one-way communication—called S. C. R. 54-A, with an amplifier which magnifies the strength of signal received. These are to be provided at the rate one for each set of major caliber batteries and one for each set of intermediate caliber batteries.

Mr. SLEMP. How many?

Maj. MAUBORGNE. Forty-seven, in all, are requested.

Mr. SLEMP. What is the cost?

Maj. MAUBORGNE. The cost of the amplifier and receiving set together is about \$175. I should like to invite your attention to the fact that the Coast Artillery has been very careful in this estimate, because the amount estimated in the signal office for this same purpose, which was stricken out of the Army appropriation bill at the request of the Chief Signal Officer because it was contained in the fortification bill, was \$226,000. In other words, the Chief of Coast Artillery reduced it, so they are only providing new radio for a part of the coast defenses. They figure that they can only pro-

vide one-third of the coast defenses with this new apparatus during the coming year under the appropriation which they are asking.

Mr. SLEMP. You will require two or more appropriations of \$75,000, then, approximately?

Maj. MAUBORGNE. Approximately; yes, sir.

Mr. SLEMP. How long would this apparatus last, presumably?

Maj. MAUBORGNE. I can not see any reason for changing this apparatus for 10 years.

Mr. SLEMP. Except the maintenance and upkeep?

Maj. MAUBORGNE. Which is a very small amount.

Mr. SLEMP. This is entirely new?

Maj. MAUBORGNE. There is absolutely nothing to take the place of this new apparatus at the present time; there is no way that the Coast Artillery can get long-range radio communication at the present time.

Mr. SLEMP. What economies otherwise would be effected by the introduction of this into the various Artillery posts?

Maj. MAUBORGNE. I might say considerable, because there are a good many of the sets now in use which are obsolete and which require repairs; and I know that during the past six months requisitions for repairs and replacements reaching the office of the Chief Signal Officer have been held up by the office of the Chief of Coast Artillery in order that we might furnish new sets which would fit into the approved plan instead of wasting money on the old type requested.

Mr. SLEMP. Speaking generally, you do not propose to do so with any of your methods of fire control with the money you are asking for this year?

Maj. MAUBORGNE. Yes, sir. I might say this: We have also under development the wire-radio system developed by Gen. Squier, using the present wire conductors and putting radio current on the telephone cables which now exist. In other words, you get something for nothing, for by superimposing radiotelegraphy or telephony upon existing conductors you get additional circuits without adding cable. However, the reason for asking for additional cable now is not to secure additional facilities between points which are now provided with cable communication but for the extension of base lines where no cable exists.

Mr. SLEMP. That is clear; but at the same time, if this is an accurate means of communication, which I presume it is or you would not ask for money for it, I still contend that you need not spend any more money on cables. If it is accurate at the end of the extension from your existing cable line it ought to be accurate at the end of the existing cable line.

Maj. MAUBORGNE. You are quite right, but the question arises as to how many radio stations you would require and how many could be used in the vicinity of a coast defense without interference.

Mr. SLEMP. You said not?

Maj. MAUBORGNE. I said that you could work no more stations than we propose in this plan in one fortification. For instance, consider the coast defenses of X. The Coast Artillery is proposing eight transmitting stations in the coast defenses of X, one for each of eight forts constituting this coast defense. Take into consideration also

the fact that that plan supposes there are eight airplanes in the air at the same time. That is a total of 16 radio-telephone or radio-telegraph sets employed simply to give the forts long-range fire-control communication from aircraft. If you will consider, then, the number of base lines that they have in that vicinity, for which you propose radio stations, you will see that the telephone sets will multiply tremendously, and if you are going——

Mr. SLEMP (interposing). The problem of interference has not been worked out?

Maj. MAUBORGNE. That is exactly it.

Mr. SLEMP. What is the cost of the telegraph instrument which you place on the back of the soldier?

Maj. MAUBORGNE. The cost will be, I think, in the neighborhood of \$250 or \$300 apiece.

Mr. SLEMP. Is that method of communication accurate?

Maj. MAUBORGNE. It is very accurate, sir. We have had some excellent results achieved in the past month in the tests at Fort Sill.

Mr. SLEMP. Have you undertaken fire control through that method?

Maj. MAUBORGNE. Yes, sir; for the Field Artillery.

Mr. SLEMP. And for the Coast Artillery?

Maj. MAUBORGNE. No, sir. I will say that they have been trying to handle base-line communication with the radio telephone set developed during the war known as the S. C. R. 67, but the results have not been entirely satisfactory. The Chief of Coast Artillery and his representatives can tell you more about that than I can.

Mr. SLEMP. They are satisfactory in the field but not on the coast?

Maj. MAUBORGNE. The Coast Artillery has a little different problem. These sets in the field are simply for sending this kind of information—"CD-BI," which in code might mean that an infantry regiment at the front needs a barrage, or another set of four letters might mean, "change the angle of your firing," "you are firing into us; shoot over us." That is about what the S. C. R. 77 set is supposed to do. It is for the purpose of giving the proper information to the field artillery so that they will not shoot into their infantry and keep the fire ahead of their own infantry.

Mr. SLEMP. It is considered not very accurate?

Maj. MAUBORGNE. I do not agree with that. I say it is not satisfactory for sending the kind of a message which the Coast Artillery must send from the ends of its base lines to the central plotting room. It is a telegraph set and telegraphy is too slow to use for transmitting base-line data.

(Statement called for by chairman inserted here:)

However, the Signal Corps is in a position to develop radio telephone sets of any power from small to great, which the Coast Artillery may find necessary after further trials of radio telephony as a means of transmitting fire-control data from the ends of the base line to the plotting room. It is quite possible also to develop radio methods of sending out ten-second radio impulses for the purpose of synchronizing the observations made on the target at base-line stations provided with radio telephone instead of wire communication.

It is to be noted, however, that when considering the substitution of radio telephone sets for fire-control cables, we must not be led into the error of believing that only base line azimuth data is to be handled over these fire-control cables. These cables provide a number of channels of communication for the transmission of information other than firing data, such as that which passes between the battery and fort commanders. Substituting a single radio set for

one end of a cable would not provide the number of channels given by the cable replaced.

Reverting to the matter of the number of radio telephone sets which would have to be installed in any coast defense for the transmission of base-line data only, we may take as a typical example the moderate-sized coast defense at X, mentioned above, in which it was found that 16 transmitters would be in operation for handling data from planes to ground. Under the present arrangement in the plotting room two men are engaged in plotting the results received by telephone from the base end stations. Each has a telephone set independent of the other, hence we find that four telephones are necessary for any single base line, solely for the purpose of reporting plotting data; so likewise there would be needed for each base line four radio telephone sets. In the district of X referred to above there are 28 horizontal base lines actually installed. Multiplying this by four radio telephone sets each, per base line, we find a total of 112 radio telephones needed for transmitting base-line data alone. This added to the 16 radio sets needed for aircraft to shore communication gives a total of 128 radio sets, without considering such sets as might be needed for communication other than base-line communication, which is now supplied by the so-called intelligence telephone lines.

Such a large number of sets of any form of apparatus at present developed or being supplied by the Signal Corps can not be used in as small a district as that of X without interfering with each other to such an extent as to render communication unreliable. In addition, there must be considered possible interference by the enemy, and while it may be argued that a great many SCR-77 sets will be used on a very narrow front by armies in the field, nevertheless, the fact still remains that these sets are not operated continuously, but rather in emergency only, whereas radio telephone sets furnished to the Coast Artillery would have to be operated incessantly and be immune from interference so as to furnish reliable communication continually, if such a system were in any way to equal the present wire system using telephones.

If we were to consider the cost of installation of simply the 112 special sets for base-line work mentioned for this district of X, at a cost of not less than \$1,000 each, it will be seen that the initial cost of installation of radio equipment for the purpose mentioned is quite comparable with that of necessary cable equipment which would give better service.

FOR OPERATION AND MAINTENANCE OF FIRE-CONTROL INSTALLATION AT SEACOAST DEFENSES, UNITED STATES.

Mr. SLEMP. What items are you appearing on, Captain?

Capt. ALBRO. Three items, Mr. Slemp: Maintenance of fire control in the United States, in the Insular Possessions, and in the Panama Canal Zone.

Mr. SLEMP. Including operation also?

Capt. ALBRO. No, sir.

Mr. SLEMP. Has that been taken away from the Signal Service?

Capt. ALBRO. Yes, sir. In that connection, I might state that the investigation initiated as a result of the preliminary inquiry made by the chairman of the committee shows that the superintendence of maintenance, which was taken away from the Signal Corps during the war because the district commander was removed from the control of the department commander, is now back in the Signal Corps, and the balance of the current year and the fiscal year 1922 will give us plenty of time to get back into the shape we were in before the war, so that we will have more accurate knowledge, through personal contact, of the actual maintenance cost of the various units.

Mr. SLEMP. You have \$165,000 for this fiscal year?

Capt. ALBRO. Yes, sir.

Mr. SLEMP. Please give us your balance on that appropriation?

Capt. ALBRO. The balance at this time is \$1,800 left of the three-quarter allotment of the fund and the entire fourth-quarter allot-

ment. That is, we have \$33,000, plus the small balance which I have named.

Col. SMITH. On January 12 the balance was \$42,673.

Capt. ALBRO. We have obligated some since then, so that we have \$1,800 left of our third quarter allotment and our entire fourth quarter. In other words, we are overobligated on a percentage basis right now; we have only \$1,800 to run until the 1st of April.

Mr. SLEMP. What will you do after that?

Capt. ALBRO. We will have \$33,000, which is the fourth quarter's allotment.

Mr. SLEMP. Can you get through this year without creating a deficiency?

Capt. ALBRO. We are going to. The point is, the estimate for 1922 was submitted for \$165,000, as shown by this photostatic copy, but, on account of a typographical error, the total was carried as \$150,000, and so appears in the Book of Estimates.

DETAILS OF EXPENDITURES.

Mr. SLEMP. Please tell us in general terms how you are spending the \$165,000?

Capt. ALBRO. It will be spent, as it was the year before, for cables, reels, telephones, time-interval and meteorological equipment, line equipment, storage batteries and repairs, testing instruments, poles, dry cells, and temporary labor.

Mr. SLEMP. What does your labor amount to?

Capt. ALBRO. Approximately \$12,750.

Mr. SLEMP. That is, during this fiscal year?

Capt. ALBRO. Yes, sir. For the next fiscal year it will be greater, because the storage and issue of fire-control equipment has been returned to the Signal Corps. These functions have been out of the control of the Signal Corps since October, 1918.

Mr. SLEMP. This entire amount of money relates to fire-control installation?

Capt. ALBRO. Maintenance of fire-control installations within the continental limits of the United States.

Mr. SLEMP. It would seem to me that you ought not need a lot of money every year; that is, the same amount of money every year. Will you not get this stabilized after a while?

Capt. ALBRO. I do not see how that can be so, Mr. Slemp, because the installation of any telephone system requires continual maintenance, as the system deteriorates, or, rather, amortizes; so that this really constitutes an amortization fund for the purpose of keeping the system in condition all the time.

Mr. SLEMP. How much are you going to expend this coming fiscal year?

Capt. ALBRO. As I said, Mr. Chairman, the Signal Corps has had no knowledge of the exact requirements, but has based its estimate for this year; that is, the year 1922, upon its experience of the past four years.

Mr. SLEMP. In other words, you are not in a position to itemize the \$165,000 that you want?

Capt. ALBRO. We could give you a general itemization, such as we gave last year.

Mr. SLEMP. In other words, you have based your request for next year upon the experiences of the preceding years?

Capt. ALBRO. Yes, sir.

Mr. SLEMP. You are not in a position to give information about the money that you want for specific purposes for next year?

Capt. ALBRO. On account of a lack of personal contact with the installations.

Mr. SLEMP. Why are not the individuals who are in a position to speak definitely about the need of this money before the committee?

Capt. ALBRO. I think that Maj. Ruhlen would say in reply to that it was on account of the war conditions. The district commander being removed from the jurisdiction of the department commander has removed the contact with the Signal Corps.

Maj. RUHLEN. The district commander is now directly under the jurisdiction of the corps area commander.

Mr. SLEMP. The commanders at the various posts in the continental United States and foreign possessions, do not they send a statement to the War Department as to their needs for next year?

Capt. ANTHONY. The requisitions are made at the fort where the material is desired. That requisition goes to the district commander—it did during the war—and the district commander then forwards the requisition to the Chief Signal Officer direct, which is more or less formal, and we had to transmit the requisition to what was Purchase, Storage and Traffic, who had charge of the issuance of supplies.

We could give you any information you want on this, but it will involve our going through the files and compiling information that is in other offices than our own. Next year that should not be necessary in the least; we should have everything, and will have everything, in our own office; that is, exactly what is issued, and know all about it.

Mr. SLEMP. Under the present system who reviews the requisitions of the department commanders?

Capt. ANTHONY. At the present time that is being done by the Signal Corps, because we are in the process of taking it back. Those requisitions will come through our representative in the corps area headquarters, and it is going to be his job to supervise everything and see that their requisitions are not too large, and that they really need the material.

Mr. SLEMP. That was your system before the war?

Capt. ANTHONY. Yes, sir; and we are getting back to a good supervising basis right now.

Mr. SLEMP. But you have before you a statement showing the purposes for which you used the money during this fiscal year?

Capt. ALBRO. Yes, sir.

Mr. SLEMP. State what you spent on cables, telephones, etc.

Capt. ALBRO. I will put that in the record.

NOTE.—Telephones, cables, and switchboards, \$58,969.36. Practically all cable was from stock, however.

Mr. SLEMP. Your best judgment now is, after looking at your department commanders' requests, that next year you will need about the same amount of money?

Capt. ALBRO. The request is \$15,000 less this year, on account of that typographical error having crept in. We are not asking that it be restored to \$165,000. We tried to put a supplemental estimate through for the \$15,000, but it was not approved. You see, we maintain the telephones, the time interval, and the meteorological apparatus under the same heading, and I would have to segregate that in my allotment books.

Mr. SLEMP. I notice that in previous years you got along with \$130,000.

Capt. ALBRO. But there have been many new installations.

Mr. SLEMP. That is, the 12-inch gun intallations?

Capt. ALBRO. Yes, sir. Then, too, the maintenance cost has gone up, because some of our systems are becoming obsolescent—that is, I mean they are deteriorating more rapidly than they did before. They have reached the peak of deterioration, and now require more each year for maintenance. I have noticed that some of the requisitions coming in from certain posts are larger than they were two years ago or a year and a half ago.

Capt. ANTHONY. Another point I would like to make is this: In the purchase of cable there is a reel that goes along with it—that is, the cable is put on a reel—and at the present time we are unable to make any arrangements with the manufacturers whereby they will accept a credit for that reel; that is to say, let us return it at the end of a year or 18 months, and if we do not then let us pay for it. However, they demand payment at the present time, and that means that every reel we pay for the money goes back into the Treasury as miscellaneous receipts, so that we lose that.

Mr. SLEMP. How much would that amount to?

Capt. ANTHONY. Last year we lost, I should say, about \$20,000.

Capt. ALBRO. It amounts to approximately 12½ per cent of all the cable purchases.

Mr. SLEMP. Have you examined the surplus and reserve stocks of the Army to ascertain whether there is any material which might be used for your purposes?

Capt. ANTHONY. Yes, sir; I have done that myself.

Mr. SLEMP. What was the result of your investigation?

Capt. ANTHONY. Well, we have in surplus stock a large amount of small cables, like 10 pair, 15 pair, and 25 pair, but those cables are not armored. By that I mean cable which simply has a lead sheath. It is a cable that has this sort of a core [indicating] and a lead sheath without any armor on it. However, we are able to use some of that cable, but it is smaller than the regular fire-control type. We are using that cable wherever we possibly can. As to the regular types of fire-control cable, which are more or less of this type [indicating], there is very little or none in surplus, and there is very little or no stock on hand.

Mr. SLEMP. In reserve?

Capt. ANTHONY. In reserve; yes.

Mr. SLEMP. What is the necessity for the armored cable?

Capt. ANTHONY. Well, that cable is a submarine cable; it is laid across bays or across rivers, wherever it happens to be. It is usually laid across bays for the purpose of connecting one fort to another, and protection of that kind is necessary, especially where there is a

rocky bottom and for the purpose of protecting it from dragging anchors or anything of that kind.

Mr. SLEMP. This has no relation to the submarine mine defense?

Capt. ANTHONY. No; it is a different make of cable entirely. A submarine-mine cable is a rubber cable, and it has to be rubber covered, because it uses a higher voltage.

Mr. SLEMP. You could not use any surplus cables of that kind for this work?

Capt. ANTHONY. Not of that nature; no, sir. That, by the way, is not armored cable, as I recall, but is simply a rubber-covered cable. This is a paper-insulated cable, so that it has to be pretty well protected, because if water got in there the paper would take up the moisture and put the cable out of commission.

Mr. SLEMP. Take your 12-inch gun fire-control installations that are equipped with cables at each end of your base line, etc., how long do those cables usually last?

Capt. ANTHONY. The base-line cables are installed either in duct systems or they are buried; by a duct system I mean it is put through a concrete duct that has been built for it. In the coast defenses the base lines are extremely long, and to construct such long lines in that way would be out of the question; the expense would run away up. So we are using armored cable simply buried in a trench at the requisite depth. That cable, barring any damage from picks, shovels, dredges, or things of that kind, and also any possible chance of flaws in manufacture, which is very small, because they are tested at the factory, should last from 10 to 15 years. In saying that I am making another assumption, and that is that the base lines are not changed and the cables are left undisturbed.

Mr. SLEMP. Your amortization, then, would be about 10 per cent?

Capt. ANTHONY. Yes, sir.

Mr. SLEMP. Is it mostly copper?

Capt. ANTHONY. It is mostly lead. There are two elements of greatest importance, lead and copper; and then, of course, there is the armor.

Mr. SLEMP. Has the estimate for this year taken into consideration the reduced price of copper and lead?

Capt. ANTHONY. Our estimate was made on the reduced price, because cable began to drop about August or September, just about the time our estimates were prepared.

Mr. SLEMP. Generally speaking, what percentage of your estimate is for cable reproduction?

Capt. ANTHONY. The amount of cable requirement is a variable quantity; we can only estimate, but ordinarily the repair and replacement of cable in all the coast defenses, of which there are about 101, amounts to about \$45,000, of which, if it ran that high, we would lose not less than \$7,000 or \$8,000 on reels.

Mr. SLEMP. Then a little less than 33½ per cent is given to your cable proposition?

Capt. ANTHONY. Yes, sir.

Mr. SLEMP. What percentage is usually given to telephones?

Capt. ALBRO. The telephones, including the time interval and meterological apparatus, run about \$25,000. Switchboards, about the same amount.

Mr. SLEMP. That would be about 16½ per cent?

Capt. ALBRO. Yes, sir; and then the power equipment and material of that kind would take up the balance.

Mr. SLEMP. Does this include kilowatt sets, etc., for the power?

Capt. ANTHONY. No, sir; that is not in there. You have no doubt been told in previous hearings that the fire-control apparatus is subjected to rather strenuous uses and very hard conditions, because at most of these coast defenses, where there is considerable moisture, the telephone service is rendered under much harder conditions than would be encountered in service to this room or building.

Mr. SLEMP. As I understand, though, there will be a rather diminished use of such apparatus in the coming year because its use was exaggerated during the period of the war.

Capt. ANTHONY. I did not quite get that point.

Mr. SLEMP. You were more active in using and experimenting with these telephones during the period of the war than you will be in the next two or three years?

Capt. ANTHONY. That may be; but these are standard makes of instruments.

FOR OPERATION AND MAINTENANCE OF FIRE-CONTROL INSTALLATIONS AT SEACOST DEFENSES, INSULAR POSSESSIONS.

Capt. ALBRO. These statements cover the items for the United States and the next item is that for the insular possessions. This estimate, Mr. Slemp, represents three component parts, two of which are in the estimate as submitted for \$43,666.66, and the other, amounting to \$36,044, was submitted as a supplemental estimate at the request of the Chief of Engineers and the Chief of Coast Artillery, but the submission of this supplemental estimate was disapproved by the Secretary of War, with the proviso, however, that the Signal Corps was given permission by the Secretary of War to present it to this committee.

Mr. SLEMP. You had \$25,000 last year. Give your balances and then take up your needs for the next year.

Capt. ALBRO. Col. Smith will give you the balance.

Col. SMITH. The amount available for new obligations on January 12 of this year was \$10,000.

Capt. ALBRO. Of which approximately \$3,400 has been expended since the 1st day of January.

Mr. SLEMP. Will you have any money left at the end of this year?

Capt. ALBRO. No, sir; we are finding it necessary to supervise the requisitions very carefully in order to keep within the limit of the appropriation.

Mr. SLEMP. Is the Signal Service in charge of this work in a different relation to what it was in the United States?

Capt. ANTHONY. We are not supposed to be in charge of that work but the conditions in the Philippines, apparently, have been such that it has been almost impossible for the Signal Corps to let go of it. We have a small technical force over there, possibly three people; it is fairly well balanced, and they have been going ahead and doing considerable of this work. As a matter of fact, just a few days ago they asked for an allotment of funds; I have just forgotten the

amount but I think it was \$10,000, which we did not have to give them, but we gave them \$5,000 and told them that amount would be all they could get for the rest of this year for all purposes.

Mr. SLEMP. Is a part of the \$25,000 used at Hawaii and a part at Panama?

Capt. ANTHONY. It is not used at Panama; it is to take care of the Philippines and the two coast defenses at Hawaii.

Mr. SLEMP. But not at Panama?

Capt. ANTHONY. No, sir.

Mr. SLEMP. How is it divided between the Philippines and Hawaii?

Capt. ANTHONY. It is divided in about this way: \$15,000 for the Philippines and about \$10,000 for Honolulu. That may vary slightly.

Capt. ALBRO. It is a little higher this year for the Philippines.

Capt. ANTHONY. The Philippines, I think, this year ran about \$15,000 or \$17,000.

Mr. SLEMP. Is the deterioration greater in the Philippines than in Hawaii?

Capt. ANTHONY. Yes. In the Philippines and at Panama the deterioration is the greatest; at Honolulu it is not so bad.

Mr. SLEMP. What per cent of this \$25,000 was given to cable reproduction?

Capt. ALBRO. \$3,500.

Mr. SLEMP. That would indicate a smaller deterioration percentage than there will be in the United States.

Capt. ANTHONY. In the Philippines, of course, the main coast defenses are on the island of Corregidor, and it is very small. The most we have is submarine cable, and that brings out the point that our \$3,500 estimate just so happened not to be enough, because one of our cables went out, and that is what necessitated this additional item of \$36,000.

FIRE-CONTROL SWITCHBOARD AND CONNECTIONS AT CORREGIDOR.

Capt. ALBRO. The \$25,000 appropriated for last year, and the year before, is considered sufficient for the maintenance proposition for the ensuing year, and it is divided as follows: \$20,495 for matériel and \$4,505 for salaries and wages. The other item going to make up the estimate, namely, an additional \$18,666.66, is for fire-control installation—that is, a new fire-control switchboard and connections at Corregidor—and those two items together form the \$43,666.66 of the previous estimate as submitted.

Mr. SLEMP. How does it happen that the switchboard will cost as much as \$18,000?

Capt. ANTHONY. The switchboard as originally installed was manufactured by the Dean Electric Co., which was then operating and had its factory in Ohio; that company has since gone out of business, and at the present time it is practically impossible to secure repair parts of any kind. I believe this is the only Dean board we have in operation now. The jacks and springs have become in bad shape and through our inability to replace them the board has become more

or less of a shamble. However, we are making the thing operate; we are even getting together all the parts we can find and sending them over there so that they can keep this thing going. The switchboard they have now is a three-section board, and the new board under the present price, with all the apparatus it will take and the incidental expense necessary to install it, will easily take that much money and more.

Mr. SLEMP. Can you fire the batteries with the present equipment?

Capt. ANTHONY. They are succeeding in keeping the board operating, but it takes a lot of work and time.

Mr. SLEMP. How much have you spent on it this year?

Capt. ALBRO. That is where this extra \$5,000 is wanted that they asked us to allot over there.

Mr. SLEMP. And, as I understand, you allotted \$5,000?

Capt. ALBRO. Yes, sir.

Mr. SLEMP. Will this new switchboard be a standard make?

Capt. ANTHONY. It will be one of the three standard makes, and we usually take the one of the lowest bidder. That happened in this case and so happened in the end to be a very expensive proposition. The three standard companies at the present time are the Western Electric, the Stromberg-Carlson Co., and the Kellogg Telephone Co. The board, if replaced, will have to be one of those three makes.

Mr. SLEMP. Do you think you can get along next year without it?

Capt. ALBRO. The maintenance cost will go up if we do not replace it. It is economy not to replace it but it is very foolish economy, because the maintenance of that switchboard and connections over there in three years will practically equal what it will cost to put a new one in.

Mr. SLEMP. The maintenance of the new type would also require some money?

Capt. ALBRO. Practically nothing the first two years.

Mr. SLEMP. How long has that switchboard been there?

Capt. ANTHONY. It has been there five years.

Mr. SLEMP. Is that the usual life of such a switchboard?

Capt. ANTHONY. No, sir; it is supposed to be amortized in about 10 years, but it is my experience that if you give them good care they will last longer. It so happens that the Dean people have gone out of business and we can not get the parts to make the necessary repairs. Another point to be brought up is that the Air Service has been assigned to one end of Corregidor, I believe a squadron of the Air Service; it has been placed on the tail of the island. Then there is another organization that has been assigned to that island, and neither of them at the present time has any telephone service, so that it is necessary for us to take care of them out of this estimate.

Capt. ALBRO. And they can not be connected to this present board because there is no room for them at all.

Capt. ANTHONY. It is the Air Service and the mobile artillery; the Air Service and the mobile artillery are there.

Mr. SLEMP. On Corregidor Island?

Capt. ANTHONY. Yes, sir; the Air Service is out on the tail of the island and the mobile artillery, of course, is along the coast line. We propose to take care of all the activities, the Air Service

included, on that island over this one board, and that is going to entail some expense.

Mr. SLEMP. This has no relation to radio communication, but is simply an ordinary telephone system?

Capt. ANTHONY. Yes, sir. It is like your telephone system here in the Capitol, except that it forms a part of the coast defenses.

Capt. ALBRO. The other item is that of the supplemental estimate which, as I stated, the Secretary of War declined to submit to Congress but authorized the Signal Corps to defend it before the committee.

Mr. SLEMP. I want to get more information about the cable which you say broke down.

Capt. ALBRO. That is the one which comes under this item; it has to do with the submarine cable between Forts Drum and Hughes in the Philippine Island, and the Chief of the Coast Artillery requested that this estimate for 41,000 feet of cable be submitted; the Signal Corps endeavored to submit it as a supplemental estimate, but the supplemental estimate was not transmitted by the Secretary of War, but he authorized the Signal Corps to defend it before the committee.

Mr. SLEMP. It has no relation to fire control, has it?

Capt. ANTHONY. Yes, sir; it is the cable that links Fort Drum and Fort Hughes together. Fort Drum is on El Fraile Island and Fort Hughes is on another island, and it takes 37,088 feet of cable to reach those two points. There is a little leeway made in this estimate for some cable with which to make repairs.

Mr. SLEMP. Do I understand this is your base line?

Capt. ALBRO. Yes; it is the base line.

Capt. ANTHONY. It could be used for the base line; but it also links up the two forts.

Mr. SLEMP. What else is it used for?

Capt. ANTHONY. In fire-control installations there are a good many other lines other than base lines, but they all serve the same purposes ultimately. However, all of them may not be used for taking data which is ordinarily done with the base line. The base line is important for transmitting data.

Mr. SLEMP. I was trying to connect it with the language of your estimate, operation, and maintenance of fire-control installations.

Capt. ALBRO. This constitutes the base line between these two forts and this portion of the cable was destroyed and has gone out completely, and it should be replaced at the earliest possible moment.

Mr. SLEMP. Do you agree with that statement?

Capt. ANTHONY. Yes; the cable is a fire-control cable; it pertains exclusively to fire-control installation and nothing else; and that is the type of cable to be used.

Mr. SLEMP. The same type as used in continental United States?

Capt. ANTHONY. Yes, sir.

Mr. SLEMP. Have you any war reserve of this cable on hand in the Philippines?

Capt. ANTHONY. We have a few thousand feet—I do not think over 5,000 or 6,000 feet—scattered around; some at one place and some at another.

Mr. SLEMP. It is your contention that without the use of this cable you can not operate the batteries on those two islands?

Capt. ALBRO. As to that question, I would ask Maj. Ruhlen to make a statement.

Maj. RUHLEN. That cable is necessary for the operation of the batteries, because no other means of communication has been provided.

Capt. ANTHONY. Without the cable the two forts are isolated.

Mr. SLEMP. Can those two cables be repaired?

Capt. ANTHONY. They can; yes, sir.

Mr. SLEMP. Why not repair this 31,000 feet of cable?

Capt. ANTHONY. That very question came up. We had two cables that went out in this same storm; one of them was repaired and is now in operation, but they have reported that this cable was damaged to such an extent that it is not worth repairing.

Mr. SLEMP. Who made that report?

Capt. ANTHONY. The department signal officer in the Philippines.

Mr. SLEMP. How long has that cable been in existence?

Capt. ANTHONY. In 1914 it was repaired and was lengthened at that time about 6,000 feet, and in 1917 it was repaired again, having been damaged at that time.

Mr. SLEMP. Have you taken it up entirely?

Capt. ANTHONY. That I can not say, but undoubtedly they have had it up to inspect it, because we have had an inspection report on it.

Mr. SLEMP. Could you place in the record the statement of the commanding officer on that subject?

Capt. ANTHONY. Yes, sir; we can, but we may have to cable for it.

Mr. SLEMP. You do not know whether it might be repaired and last another year?

Capt. ANTHONY. We can get a definite statement from the Chief Signal Officer in time to go in the record, if you desire.

Mr. SLEMP. I would like to have it.

NOTE.—Cable reply not received as yet but will be sent to the committee as soon as it reaches this office.

Gen. COE. With regard to the use of that cable, it is absolutely essential for the operation of those batteries; that is, there must be a cable communication between those points. Fort Drum and Fort Hughes, which are low-sited batteries, have no means of determining ranges or the position of targets except by the use of a cable, but it does not necessarily mean the use of that cable as a base line. For example, there are heights of several hundred feet on Corregidor Island by which the positions of ships may be determined by a vertical base, but a cable, if they were so determined, would be absolutely necessary to transmit the information as to their location. That was where the question became confused slightly, as to whether they were always necessary as base lines. They are always necessary to convey information, but sometimes the positions of vessels may be determined by a vertical base line.

Mr. SLEMP. In view of the fact that there could not be much interference with the radio communications, could we not use the radio system there?

Gen. COE. Well, we have never been able yet to use the radio telephone with certainty.

Mr. SLEMP. Or the radio telegraph?

Gen. COE. We can not use the radio telegraph because it is too slow; the radio telegraph is impossible for base-line work, and the radio telephone has not yet reached the stage where we can use it with certainty. We have them, however, at all of our coast defenses and we are trying to use them for various kinds of communications, but in base-line work or in fire-control work it is a question of absolute certainty of communication, otherwise the batteries are useless, and the small amount of expenditure required for the necessary communication, as compared with the cost of the battery, should always be provided in order to give certainty of information. Of course, there may come a time when we can use the radio telephone, but at the present time our interference, and that produced by the enemy, makes it a thing which we can not rely upon.

OPERATION AND MAINTENANCE OF FIRE-CONTROL INSTALLATION AT SEACOAST DEFENSES, PANAMA CANAL.

Mr. SLEMP. Now take up Panama.

Capt. ALBRO. The estimate as submitted for Panama is the same as has been carried in the appropriation for several years past, \$15,000, which is divided, \$1,000 for salaries and wages and \$14,000 for material.

Mr. SLEMP. What is the balance on hand at the present time?

Col. SMITH. The balance on hand on January 12, 1921, was \$6,000.

Capt. ALBRO. As against that, there has been a proportionate expenditure in the intervening time the same as from the other appropriations, so that the balance, in all probability, does not exceed \$4,000, and the entire appropriation will be used during the current fiscal year.

Mr. SLEMP. Have you had a report from the department commander or from the officer in charge?

Capt. ALBRO. Yes, sir; his requisitions for matériel and funds for the fourth quarter have been received.

Mr. SLEMP. Will you use all of the \$15,000?

Capt. ALBRO. Yes, sir.

Mr. SLEMP. Your estimate of \$14,000 for matériel next year is for what?

Capt. ALBRO. As stated before, with regard to dividing up these appropriations into various classes and items, it varies from year to year. Cable down there will possibly run about \$3,000.

Mr. SLEMP. Have you had a specific requisition for that?

Capt. ALBRO. No, sir.

Mr. SLEMP. You are just estimating, then?

Capt. ALBRO. We can give the specific items if you want them. I can show you exactly everything used down there.

Mr. SLEMP. I mean for next year.

Capt. ALBRO. For next year our estimate is that it will take about the same as we have used this year.

Mr. SLEMP. You have no specific information on the subject, but you estimate that inasmuch as you had \$15,000 last year you will require \$15,000 for next year?

Capt. ALBRO. Yes, sir. That is not only true of this year, but that has been the prevailing rate of expenditure in preceding years.

Mr. SLEMP. In 1917 you got along with \$10,000, in 1918 you got along with \$10,000, in 1920 you got along with \$10,000.

Capt. ANTHONY. In one year we had a deficiency appropriation of \$5,000.

Mr. SLEMP. I am including that.

Capt. ALBRO. I would say with regard to that, I do not recall the estimate or appropriation for 1920 being \$10,000, although it evidently was from the statement here, but I do know that the current year's expenditures have been such that there have been several disapprovals because we did not have the funds to meet them. I believe I am correct in stating that the reserve stock at Panama has been entirely exhausted.

Mr. SLEMP. Did you itemize the \$14,000 estimate for matériel?

Capt. ALBRO. Yes, sir.

Mr. SLEMP. Would you have charge of this business now?

Capt. ALBRO. Yes, sir.

Capt. ANTHONY. We supply the matériel and will have charge of the expenditures.

Mr. SLEMP. When was the change made?

Capt. ANTHONY. It has been made within the last two months. We have gotten their approval within the last month.

Capt. ALBRO. Next year we will be able to show you a budget of this proposition, itemized down to the last cent.

STATEMENT OF BASIS OF ESTIMATE FOR OIL AND GASOLINE FOR 25-KILOWATT SETS AND MOBILE SEARCHLIGHTS, CONTINENTAL UNITED STATES.

All 25-kilowatt sets are required to be run at least two hours a week in order to be sure that they are in operating condition. In addition, it is estimated that the sets other than reserve sets must be run during drills for a total of approximately 150 hours a year. It is estimated that each of the mobile searchlights will be operated on an average of 250 hours per year. Figured on the above basis, the following are the requirements for the fiscal year 1922:

2,000 gallons gasoline each for 219 25-kilowatt sets, at 28½ cents.....	\$124,830
40 gallons oil each for 219 25-kilowatt sets, at 75 cents.....	6,570
2,170 gallons gasoline each for 58 mobile searchlights.....	35,900
44 gallons oil each for 58 mobile searchlights.....	1,910
To	169,210

BASIS OF ESTIMATE FOR PRESERVATION AND REPAIR, PHILIPPINE ISLANDS.

	Original estimate.	Reduced estimate.
Maintenance of land defense roads and trails.....	\$8,000	\$4,000
Repairs to plumbing, water supply, and drainage.....	3,000	2,000
Painting.....	9,500	3,000
Repairs to doors and windows.....	2,000	2,000
Repairs to land defense structures.....	3,000	2,000
Repairs to fire control stations.....	6,000	3,000
Repairs to searchlight shelters.....	2,000	1,000
Repairs to conduits, etc.....	3,000	1,000
Miscellaneous items and supplies for Artillery.....	15,000	10,000
Clearing trail of Corregidor Island.....	500	.....
Repairs to submarine-mine wharves.....	5,000	.....
Repairs to trackage.....	1,000	500
Repairs to submarine mine structures.....	2,000	1,300
Maintenance and operation of floating plant.....	10,000	5,000
Maintenance of Manila and Fort Mills offices.....	15,000	15,000
Total.....	85,000	50,000

In general, the difficulty of accomplishing the preservation and repair of fortifications at the defenses of Manila and Subic Bays with the limited appropriations which have been available in the past is apparent when it is considered that the cost of ordinary materials required is much higher in the insular possessions than is ordinarily the case in this country. The following prices of materials purchased at Manila are examples: Cheapest lumber, \$100 to \$125 per thousand; common nails, 10 to 11 cents per pound; cheapest grade of oil paint, \$3 to \$4 per gallon; cement, about \$7.50 per barrel; reinforcing steel, about 6 cents per pound (have been paying 8 cents per pound); ironwork, as high as 50 cents per pound; coal, \$15 per ton (from the Quartermaster Corps—commercial prices are higher).

In addition, on account of climatic conditions the deterioration of all construction materials, with the exception of concrete, is very rapid. If the defenses are to be kept in an efficient condition, improvements, additions, and modifications must be made constantly, and there must be maintained an organization of technical and clerical personnel sufficient to carry on the supervision of the plans and the work, together with the incidental details. The amount of the estimate for the maintenance of the Manila and Fort Mills offices is considered to be very conservative, particularly in view of the fact that the overhead resulting from the maintenance of such organizations must, in the case of the Manila district, be charged directly to fortification funds instead of being distributed over several classes of work, including river and harbor projects, as is the case in engineer districts in the United States.

STATEMENT OF BASIS OF ESTIMATE FOR OIL AND GASOLINE FOR 25-KILOWATT SETS AND MOBILE SEARCHLIGHTS, INSULAR POSSESSIONS.

All 25-kilowatt sets are required to be run at least two hours a week in order to be sure that they are in operating condition. In addition, it is estimated that the sets other than reserve sets must be run during drills for a total of approximately 150 hours a year. It is estimated that each of the mobile searchlights will be operated on an average of 250 hours per year. Figured on the above basis, the following are the requirements for the fiscal year 1922:

Hawaiian Islands:

2,000 gallons gasoline each for 27 25-kilowatt sets, at 28½ cents.....	\$15,390.00
40 gallons lubricating oil each for 27 25-kilowatt sets, at 75 cents.....	810.00
625 gallons gasoline each for 2 5-kilowatt sets, at 28½ cents.....	356.25
16 gallons lubricating oil each for 2 5-kilowatt sets, at 75 cents.....	24.00
2,170 gallons gasoline each for 3 mobile searchlights, at 28½ cents....	1,855.35
44 gallons lubricating oil each for 3 mobile searchlights, at 75 cents..	99.00

Total..... 18,534.60

Philippine Islands:

Central plant, Forts Mills and Wint—

Engine and cylinder oil for 2,000 horsepower, at \$100 per 1,000 horsepower per year.....	200.00
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Central plant, Fort Drum—

Fuel oil, 70,880 gallons, at 12½ cents.....	8,860.00
Lubricating oil, 8,532 gallons, at 75 cents.....	6,399.00
2,000 gallons gasoline each for 36 25-kilowatt sets, at 28½ cents.....	20,520.00
40 gallons lubricating oil each for 36 25-kilowatt sets, at 75 cents.....	1,080.00
2,170 gallons gasoline each for 6 mobile searchlights, at 28½ cents....	3,710.70
44 gallons lubricating oil each for 6 mobile searchlights, at 75 cents..	198.00

Total..... 40,967.70

Panama Canal:

2,000 gallons gasoline each for 42 25-kilowatt sets, at 28½ cents.....	23,940.00
40 gallons lubricating oil each for 42 25-kilowatt sets, at 75 cents.....	1,260.00
2,170 gallons gasoline each for 2 portable searchlights, at 28½ cents...	1,236.90
44 gallons lubricating oil each for 2 portable searchlights, at 75 cents..	66.00

Total..... 26,502.90

MONDAY, FEBRUARY 7, 1921.

ORDNANCE DEPARTMENT.

STATEMENTS OF BRIG. GEN. W. S. PEIRCE, ASSISTANT CHIEF OF ORDNANCE; MAJ. G. F. JENKS; MAJ. L. B. MOODY; COL. C. L'H. RUGGLES; MAJ. H. C. DAVIS; MAJ. K. B. HARMON; MAJ. M. MURRAY; AND MAJ. A. J. STUART.

GENERAL STATEMENT.

Mr. SLEMP. You occupy what position in the Government service?

Gen. PEIRCE. I am Assistant Chief of Ordnance.

Mr. SLEMP. Will you make a general statement about the ordnance situation?

Gen. PEIRCE. Mr. Chairman, we have put our case up to you already in as complete form as we could prepare it, and I would like to call particular attention to this phase of it: Realizing the very difficult and practical situation you gentlemen were up against, we have endeavored to afford all the assistance to the committee we could in the way of indicating the relative importance of not only the different items, but the different parts of the items, and to that end we have classified all of our estimates into three classifications, A, B, and C, the A classification containing those items and parts of items which we believe sincerely can not be postponed another year without manifest injury to the service; B, those items which, while necessary and things that ought to be done, can be postponed for a year or two should the committee decide that it is advisable to do that; and C, covering those items or parts of items which, in the light of present information, and information that was not available to us at the time we prepared the estimates originally, are now withdrawn for the reason that in the present status of our work we could not advantageously use the money in the coming year even if it were appropriated.

Mr. SLEMP. The total estimate under the A, B, and C classification, was what?

Gen. PEIRCE. The total amount estimated under A, B, and C, when the estimates were originally submitted, was \$25,500,000. The total of A items amounts to \$15,500,000; the total of B items amounts to \$7,456,493; and the total of C items amounts to \$2,547,409.

Mr. SLEMP. The A estimates are \$15,500,000?

Gen. PEIRCE. \$15,533,980.

Mr. SLEMP. Including the insular possessions and Panama?

Gen. PEIRCE. Yes, sir.

Mr. SLEMP. And maintenance also?

Gen. PEIRCE. Yes, sir.

ARMAMENT OF FORTIFICATIONS.

PURCHASE, MANUFACTURE, AND TEST OF MOUNTAIN, FIELD, AND SIEGE CANNON, UNITED STATES.

Mr. SLEMP. This item is for purchase, manufacture, and test of mountain, field, and siege cannon, including carriages, sights, implements, and the machinery necessary for their manufacture, under

which you ask this year for \$1,500,000. Will you state your balance under this appropriation?

Gen. PEIRCE. On December 31 the unallotted balance was \$4,235,500.67, of which \$163,546.22 was reserved, so that the unreserved or absolutely free balance is \$259,954.45.

Mr. SLEMP. Do you expect to use that \$259,954.45 during this fiscal year?

Gen. PEIRCE. Yes, sir.

Mr. SLEMP. State to the committee just what use your money has been and will be put to during this fiscal year.

Maj. JENKS. I have a statement showing the use of the appropriation "Armament of fortifications, 1921, B," and I will read the items if you wish. It is in form to go into the record.

(The statement referred to is as follows:)

Statement of appropriation "Armament of Fortifications, 1921, B," as of Jan. 29, 1921.

Purpose.	Reserved.	Allotted.	To be allotted prior to June 30.	Total.
Inspection and storage of gages.....	\$47,000.00	\$47,000.00	.....	\$47,000.00
Record of shop practice.....	15,000.00	13,500.00	\$1,500.00	15,000.00
1 experimental 14-inch railway mount.....	200,000.00	200,000.00	.....	200,000.00
Complete, 22 14-inch guns.....	185,680.00	185,680.00	14,320.00	200,000.00
Jigs and fixtures for artillery.....	55,000.00	38,500.00	16,500.00	55,000.00
3 14-inch railway mounts.....	40,000.00	.....	70,000.00	70,000.00
Jigs and fixtures for tanks, tractors, and trailers....	20,000.00	20,000.00	.....	20,000.00
Re-issue drawings of fire control.....	2,000.00	1,000.00	1,000.00	2,000.00
Salaries, etc., inspection force.....	5,000.00	4,700.00	1,300.00	6,000.00
Miscellaneous.....	3,900.00	3,900.00	5,000.00	8,900.00
Westerfelt board project.....	153,579.39	.....	.....	.....
Infantry howitzer.....	.....	7,243.11	.....	7,243.11
155-millimeter gun and 8-inch howitzer matériel....	.....	77,300.00	48,700.00	126,000.00
4.7-inch caterpillar mount.....	.....	.....	80,000.00	80,000.00
Miscellaneous caterpillar work.....	.....	6,927.00	17,964.61	24,891.61
Fire control.....	.....	1,060.00	10,000.00	11,060.00
105-millimeter howitzer carriage.....	.....	5,000.00	.....	5,000.00
Salaries of inspectors.....	.....	8,900.00	9,100.00	18,000.00
Miscellaneous.....	.....	3,349.28	.....	3,349.28
Allotment roll.....	40,000.00	40,000.00	.....	40,000.00
Travel.....	9,000.00	9,000.00	.....	9,000.00
Transportation.....	18,000.00	18,000.00	.....	18,000.00
Technical staff for light armor plate, testing tank, tractor and caterpillar mount matériel; also acceptance tests on guns and carriages.....	8,460.00	14,000.00	38,500.00	52,500.00
Tank, tractor, and trailer division.....	.....	381,396.49	99,659.51	481,056.00
Total.....	802,619.39	1,086,455.88	413,544.12	1,500,000.00

JIGS AND FIXTURES.

Mr. SLEMP. What results were accomplished by the use of that money?

Maj. JENKS. First, we have continued work on putting into condition for storage the jigs, fixtures, and gauges that were salvaged in the contractors' plants, and we have done work on consolidating the manufacturing records of war contractors' plants so as to put them into condition for use in the future.

Mr. SLEMP. Will that work be completed during this fiscal year?

Maj. JENKS. No, sir; it will not be. We hope to complete the jigs, fixtures, and gauges in the next fiscal year.

Mr. SLEMP. How many men are employed on that work now?

Maj. JENKS. At all the arsenals, about 100 men at the present time. The work of consolidation of the production records will require several years.

Mr. SLEMP. What is the next important item?

CONSOLIDATION OF PRODUCTION RECORDS.

Maj. JENKS. The item of consolidation of production records.

Mr. SLEMP. Is that an office proposition?

Maj. JENKS. It is an office proposition, utilizing production men of experience. There has been gathered in from the different war contractor plants all of the records showing how they manufactured material, and what special facilities were used, the drawings of special facilities, list of operations, methods of heat treatment, etc.

Mr. SLEMP. How much of a force do you have at work on that?

Maj. JENKS. Not more than 10 or 12 men at all of the arsenals. The principal records are filed at the arsenals charged with the production of the materials, and there will be a copy of those records in the Office of the Chief of Ordnance.

On the 14-inch railroad mount, we have under manufacture the pilot railway mount, and the cradle and tipping parts are practically completed.

Mr. SLEMP. I thought you completed them last year.

Maj. JENKS. No, sir; that was what we called the model E, which was a prewar development. We also had completed some war models of the 14-inch railroad matériel for field use. The new pilot is a development based on both the 14-inch railway mount model E, and of the field mounts which were used during the war.

Mr. SLEMP. Will you complete it this fiscal year?

Maj. JENKS. We had hoped to this fiscal year, but we will not be able to do so.

Mr. SLEMP. What model did you use in firing at Aberdeen?

Maj. JENKS. We have fired at Aberdeen model E, and also the Navy models which were manufactured for field work.

Mr. SLEMP. Have you been able to perfect those naval mounts?

Maj. JENKS. We are not attempting to perfect those mounts further for the reason that they have been developed for field work only and not for seacoast work.

Mr. SLEMP. What are you doing with them?

Maj. JENKS. They are part of the railroad reserve.

Mr. SLEMP. Where are they stored?

Maj. JENKS. Some of them at Aberdeen. I am not sure whether any of them have been turned over to Camp Eustis or not. I am informed that some of them are at Camp Eustis.

Mr. SLEMP. Are they supposed to be a part of the Field Artillery equipment?

Maj. JENKS. Yes, sir; a part of the railroad artillery equipment.

Mr. SLEMP. Are they turned over to the seacoast artillery?

Maj. JENKS. Yes, sir; to the seacoast artillery.

Mr. SLEMP. They would not be a part of the Field Artillery?

Cen. PIERCE. The Coast Artillery handles the railroad artillery that is used in land operations.

Mr. SLEMP. Do you separate the 14-inch guns, with their mounts, from the Field Artillery service?

Maj. JENKS. From what is known as Field Artillery. They are a part of the mobile artillery, but they come under the Coast Artillery and not under the Field Artillery.

Mr. SLEMP. Then, it ought not to be under this item, ought it?

Maj. JENKS. The estimates for 14-inch guns and 14-inch railroad mounts have been transferred this year to DFG. They were under B during the war, but they are withdrawn from that appropriation in the estimates this year.

INFANTRY HOWITZER.

Mr. SLEMP. Is there any money that you propose to expend under B that involves anything at all in relation to building 14-inch guns or their mounts?

Maj. JENKS. No, sir; but there are three 14-inch railroad mounts on which we proposed to expend \$70,000 that has not yet been ordered.

Mr. SLEMP. How much will they cost?

Maj. JENKS. Around \$300,000 each.

Mr. SLEMP. Where will they be made?

Maj. JENKS. Most of them will be made at Watertown. Some part of them will be purchased from commercial sources. Now, as to the project of the Westervelt Board, I have here some photographs which show the progress made. The first one is the Infantry howitzer.

Mr. SLEMP. What is the caliber of that?

Maj. JENKS. It is 2.24-inch caliber. It has been completed, and is now being shipped to the Aberdeen Proving Ground for test.

Mr. SLEMP. What kind of howitzer is this?

Maj. JENKS. This is to be fired against machine gun nests.

Mr. SLEMP. What is its size?

Maj. JENKS. It is 2.24-inch caliber, and it fires about a 6-pound projectile.

Gen. PEIRCE. The gun and carriage come part into loads that one man can carry. It is a gun for the Infantry to carry forward with it.

Mr. ANTHONY. They used to provide a 37 millimeter gun for that purpose, and now you have gone beyond that?

Maj. JENKS. It is the desire of the Infantry to develop a piece which would replace both the 37 millimeter gun and the 3-inch Stokes trench mortar, and this was designed to accomplish that purpose.

Mr. ANTHONY. This is what you call an accompanying gun?

Maj. JENKS. Yes, sir; or rather, an accompanying howitzer.

Mr. ANTHONY. What is the difference between the howitzer and a field piece?

Maj. JENKS. The gun has a higher velocity and is a longer piece than the howitzer, and under the old designs the gun fired at a comparatively low angle up to not over fifteen or twenty degrees. The howitzer of the old designs fired at angles up to thirty or forty degrees. It was a shorter piece, with a lower muzzle velocity. The mortar was a still shorter piece with a lower muzzle velocity, and was fired at an angle above forty-five degrees elevation. These distinctions are no longer exact.

Mr. SLEMP. You did not make any estimate last year for the expenditure of any money on that gun, did you?

Maj. JENKS. Yes, sir; that was included as a part of the project.

Mr. SLEMP. You have made how many of them?

PACK HOWITZER.

Maj. JENKS. We have two of that particular model which are on the way to Aberdeen now for test. The next is the 75-millimeter pack howitzer, which has been completed and which has been given preliminary firing tests at the Rock Island Arsenal. That is for use as a mountain gun, and it is so designed as to break up into loads not exceeding 225 pounds in weight to be carried on a mule's back.

Mr. SLEMP. That is a 75-millimeter gun?

Maj. JENKS. Yes, sir; 75-millimeter caliber.

Mr. SLEMP. You call that a howitzer gun?

Maj. JENKS. That is a pack howitzer. It is called a pack howitzer on account of its being designed so as to be packed on a mule's back.

Mr. SLEMP. The dimensions are about the same as those of a 75-millimeter gun?

Maj. JENKS. No, sir; it is very much shorter. The total weight is about one-third that of a field gun.

Mr. SLEMP. What is the cost of that sort of gun?

Maj. JENKS. The cost in quantity?

Mr. SLEMP. What did it cost you to make it this year?

Maj. JENKS. The total allotment for the 75-millimeter pack material development work, which included some design costs outside of the pilots made, runs to \$97,116. I can not tell you what the exact cost is because we have not all the records in yet.

Mr. SLEMP. Neither one of these guns was used during the war, as I understand it—that is, neither the pack gun nor this one?

Maj. JENKS. The service had been equipped with the 2.95-inch pack howitzer of a different model, but we had so few that none of them got to France. We have only in the neighborhood of 100 pack howitzers now.

Mr. SLEMP. This is of a new type?

Maj. JENKS. Yes, sir.

Mr. SLEMP. In what respect does it possess advantage over what you have?

Maj. JENKS. The old howitzer was developed about the time of the Spanish-American War, and it is unstable in firing. When it is fired the pack howitzer jumps all over, and it disturbs the aiming of the piece. Then there is no traverse in the old material. They have to be pointed by moving the trail. In this piece the trail is much longer, and there is a longer recoil, so that it is stable and can be fired without jumping.

Mr. SLEMP. Is there any other difference in the gun?

Maj. JENKS. Yes, sir; it is much more powerful.

Mr. SLEMP. It is a longer gun?

Maj. JENKS. It is longer and has greater range.

Mr. SLEMP. How much greater?

Maj. JENKS. The range is 6,500 yards in comparison with 5,000 yards for the old piece.

Mr. SLEMP. How many did you make of them?

Maj. JENKS. Two.

Mr. SLEMP. The cost was \$97,000?

Maj. JENKS. No, sir; that was the total cost of the development work. That includes also a designing contract for another design for the pack howitzer.

Mr. SLEMP. Where was this gun made?

Maj. JENKS. At Rock Island, Watervliet, Watertown, and Frankfort Arsenals. Different components were made at different places.

Mr. SLEMP. It has a recuperator?

Maj. JENKS. Yes, sir; a hydro-pneumatic recuperator such as used on the 75-millimeter gun.

Mr. SLEMP. How about the trail?

Maj. JENKS. It has a box trail.

Mr. SLEMP. When do you expect deliveries?

Mr. JENKS. They have been given the preliminary firing test at Rock Island. There are some minor alterations to be made in them, and they are to be shipped over to Aberdeen for proof this next month.

75-MILLIMETER GUNS WITH SPLIT TRAIL.

Mr. SLEMP. What else have you?

Maj. JENKS. The next is the 75-millimeter gun with split trail. That has also been given a preliminary firing test at the Rock Island Arsenal. It is a development according to the Westervelt Board program of a 75-millimeter piece with a range of 15,000 yards, capable of a maximum elevation of 80 degrees, and a traverse of 30 degrees.

RANGE OF 75 MILLIMETER GUNS.

Mr. SLEMP. How much longer is it than the ordinary 75-millimeter gun?

Maj. JENKS. About 50 per cent longer, and it has about 50 per cent longer range.

Mr. SLEMP. How does that range compare with the range of the 75-millimeter gun used during the war?

Maj. JENKS. It is about 50 per cent greater.

Mr. SLEMP. How much does it cost?

Maj. JENKS. I can not give you the cost of the piece, because included in the order are some 75-millimeter guns developed for two types of caterpillar mounts. There is also a Bethlehem design contract. The total allotment all 75-millimeter gun and 105-millimeter howitzer matériel is \$592,948. That includes the 75-millimeter split trail, similar to the photograph; 75-millimeter box trail, similar to the photograph; 105-millimeter howitzer of both types and also another design of both types made by the Bethlehem Steel Co. We have also allotted under the 75-millimeter \$101,252 for caterpillar mounts. This photograph shows the Holt caterpillar mount, which is now under road test in California. The Christie type of caterpillar mount is similar in appearance and principle of construction to the photograph of the 155 mount. I have here also a photograph of the 105-millimeter howitzer which is being given a preliminary firing test. It is at the Rock Island Arsenal. The 75-millimeter box trail mount will not be completed until the end of the fiscal year. We hope to get the 105 box trail mount and the

Christie caterpillar mount some time about the end of this fiscal year. That [indicating] shows the 105-millimeter howitzer on the box trail mount. We have also developed and have under manufacture 3-inch and a 4-point 7-inch antiaircraft guns which will go on caterpillar mounts. All of the matériel that is under manufacture we had hoped to complete by the end of this fiscal year, but I am afraid that they will not be completed and assembled for test until fall. The 4.7-inch gun on caterpillar mount is in the same condition, being under manufacture.

Mr. SLEMP. How many of those?

Maj. JENKS. One each of those. The 4.7-inch field gun, which is also under manufacture, we hope to complete at the end of the present fiscal year. The gun carriage is also under manufacture, and a caterpillar mount, which is under design only. The 155-millimeter howitzer is under manufacture, and we hope to complete that at the end of this fiscal year. There will be some work on these pieces next year, however.

Mr. SLEMP. One?

HOWITZER FOR CATERPILLAR MOUNT.

Maj. JENKS. Yes, sir. We are also making a 155-millimeter howitzer for a caterpillar mount.

Mr. SLEMP. Is that the Christie type?

Maj. JENKS. No, sir; that is the 155-millimeter gun mount, of which we are building one. Also one recuperator and an 8-inch howitzer to go on the same wheel mount. We are also building one of these [indicating] to go on a caterpillar mount. We hope to complete this by the end of the fiscal year, but it will not be assembled and proof fired before fall. This photograph [indicating] shows the type of 155-millimeter caterpillar mount. We have also 155-millimeter trench mortars under manufacture, which should be completed at the end of this fiscal year. I thought these photographs would be interesting to you as showing the complexity of some of the minor parts of artillery. That [indicating] is a sight for a pack howitzer. I have here a photograph of a sight for a 75-millimeter gun, and here is a 75-millimeter caterpillar mount which is under test in California.

Mr. SLEMP. Built by a commercial organization?

Maj. JENKS. Yes, sir.

Mr. SLEMP. They build a tractor for commercial purposes?

Maj. JENKS. Yes, sir. It is one of the few war contractors who has taken any interest in the further development of the war material which is similar to the material in which they are interested commercially.

Mr. SLEMP. Is that an organization outside of the Christie organization?

Maj. JENKS. It is in addition to the Front Drive Wheel Motor Co., of which Mr. Christie is the president. The mounts are under ordinary contracts.

Mr. SLEMP. All of these guns that you have made during the present fiscal year have been manufactured out of funds appropriated during the last fiscal year and out of funds held over from the war appropriations?

Maj. JENKS. Yes, sir.

Mr. SLEMP. And used for this experimental or development work; that is, this is the result of the expenditure of that money?

Maj. JENKS. Yes, sir.

WESTERVELT BOARD.

Mr. SLEMP. You are working as recommended by the Westervelt Board report?

Maj. JENKS. Yes, sir.

Mr. SLEMP. Of course, that report has never been accepted in any way by Congressional action, so far as I know.

Maj. JENKS. No, sir; this is merely a program.

Mr. SLEMP. Neither has the War Department officially recommended it?

Maj. JENKS. It has been approved by the Chief of Staff.

Mr. SLEMP. In what way has the Secretary of War functioned on the Westervelt Board proposition?

Maj. JENKS. The Secretary of War has approved the use of funds for the development of material under that program.

Mr. SLEMP. How much money have you expended this fiscal year from all sources on this new type of gun?

Maj. JENKS. I can not give you that information from the figures which I have. The figures which I have show the total expenditure made this year and the past years also. The total allotments under the Westervelt Board project have been \$2,760,362.52.

Mr. SLEMP. And you propose to expend this year how much?

Maj. JENKS. The actual allotments made from funds for this fiscal year amount to about \$153,000 exclusive of 14-inch pilot mount work. The other amount includes what was allotted from the funds available before this fiscal year.

Mr. SLEMP. If I understand, there is no money left in the War Department at any place for any of these types of guns for experimental purposes, except such money as will be appropriated by this committee hereafter?

Maj. JENKS. Yes, sir; after this fiscal year.

Mr. SLEMP. In other words, the proposition is completed, so far as the use of any money not appropriated by the committee is concerned?

Maj. JENKS. After this fiscal year.

Mr. SLEMP. In other words, for example, we appropriated this year, under this item \$1,500,000 and out of this item you have spent several million dollars more?

Maj. JENKS. We have expended since the beginning of this development work——

Mr. SLEMP (interposing). During this fiscal year you have expended considerably more than the \$1,500,000 on "Armament of Fortifications B"?

Maj. JENKS. Yes, sir. We have not obligated more, but we have actually expended at the arsenals more than that.

CURRENT EXPENDITURES.

Mr. SLEMP. You have expended under "Armament of Fortifications B" this fiscal year, I should say, something like a little over \$3,000,000; is that right?

Maj. JENKS. It depends on what you mean by expenditure. If you mean the amount which has been obligated this fiscal year, it will equal the amount appropriated for this fiscal year. I would say that prior to the fiscal year there were amounts allotted to the arsenals and covered by contracts or orders which are included in the larger amount above given, but those are for orders placed before this fiscal year.

Mr. SLEMP. Under armament of fortifications B, you received \$1,500,000 and you are going to spend all of that this year?

Maj. JENKS. Yes, sir; that is totally allotted or obligated.

Mr. SLEMP. You had as a carry-over that you will also expend this year—how much?

Maj. JENKS. During the hearings——

Mr. SLEMP (interposing). You said last year you were going to allot \$1,200,000?

Maj. JENKS. Yes, sir. During the hearings it was stated before the subcommittee that we expected to allot \$1,200,000 more. Later, based on a statement which was furnished by the chairman of this committee, we said to the Senate committee that we expected to spend \$1,000,000 over the \$1,200,000, making \$2,200,000.

Mr. SLEMP. That is plus the \$1,500,000?

Maj. JENKS. Yes, sir.

Mr. SLEMP. So you will have expended this fiscal year under armament of fortifications B, \$3,700,000?

Maj. JENKS. \$2,200,000 was obligated during the fiscal year before this.

Mr. SLEMP. I am not speaking about that.

Maj. JENKS. No, sir; that is not the case.

Gen. PEIRCE. I think that is true.

Maj. JENKS. This statement, I think, is correct.

Mr. SLEMP. You will expend this fiscal year from all sources, including the appropriation for this fiscal year, last year, and including the money carried over under contracts, \$3,700,000 under armament of fortifications B?

Maj. JENKS. We are spending since March 25, 1920, a total of \$3,700,000; that is, since March 25, the date of the hearings a year ago, but a part of that is during the fiscal year 1920 and a part during the fiscal year 1921.

Mr. SLEMP. For the coming year you will have none of this money to spend; you will have just such an amount of money——

Maj. JENKS (interposing). As Congress appropriates.

Gen. PEIRCE. We have a very complete tabulation of the expenditures under the war funds made as a result of and in accordance with the hearings held before the committee last year, which, I think, is in the papers already submitted by us.

Mr. SLEMP. And the result would be shown in what you have had delivered and what will be delivered within the fiscal year?

Maj. JENKS. There were some funds expended for other purposes.

Mr. SLEMP. Have you built what you would call the best types recommended by the Westervelt Board? You have built the pack 105 and 75 and the howitzer 155?

Maj. JENKS. The first ones are completed.

Mr. SLEMP. As I understand, all of these are simply refinements of the guns that were used during the World War?

Gen. PEIRCE. More effective guns, with a longer range and a higher power.

Mr. SLEMP. The general theory of the War Department in spending money on these guns, in view of the tremendous amount of material that you have on hand, was what?

Gen. PEIRCE. To keep pace with the progress that is being made at the present time abroad, so that we should at least have designs and pilot material for service tests of artillery equal in power and range to that which is being developed abroad and which would be brought against us in the event of war.

Mr. SLEMP. Did you have any information about this development abroad?

Gen. PEIRCE. Yes, sir; a great deal of information.

Mr. SLEMP. You did not have any previous information in regard to production?

Gen. PEIRCE. They are making developments the same as we are doing ourselves.

Mr. SLEMP. Last year you submitted to the committee a statement of the material which you had on hand, including the various types of guns that you have now on hand, and you were asking for some money in the various arsenals to complete some of the guns which were nearly in the state of completion?

Gen. PEIRCE. Yes, sir.

Mr. SLEMP. Do you wish to make any change in that statement as to what you have on hand of these types of 75 mm., 4.7-inch guns, the 155-mm., etc.?

Gen. PEIRCE. There are some minor changes, but I think none of any importance.

ARTILLERY UNDER GREBLE AND TREAT BOARDS.

Mr. SLEMP. Please be good enough to put into the record a little statement that we did not get into the record last year; that is, the Greble report, the Treat report, and then your experience in France as to the relation between field artillery and infantrymen, and so forth, the number of men corresponding to the number of guns. Then I should like to have you state to what extent you have material on hand for the equipment of the field artillery of the Army under the reorganization act of June 4, 1920.

Gen. PEIRCE. I should like to make this perfectly clear. The reserve artillery and ammunition which we have on hand we consider our primary reserve now and for a number of years to come and in the event of war it would be the material that would certainly be used in the first 12 or 18 months of the war. This new material which we are engaged in designing and in producing pilot mounts for tests is in accordance with the Westervelt Board program and may be generally characterized as being material which is of greater range and power and susceptible of higher elevations. In other words, it is an improvement over the existing types. It is not expected to put those types in production for some time to come, more than the number that would be required for service tests, but we consider it very important to have the designs on hand and to keep abreast of the developments that are being made abroad, so that when new

production shall again become necessary we shall have the designs for the best and most advanced types to produce rather than to produce those which are more or less obsolete.

FEBRUARY 10, 1921.

Subject: Artillery under Greble and Treat Boards.

Hon. C. B. SLEMP,
House of Representatives.

SIR: 1. Under the Greble Board report, approved February 4, 1911, artillery for 6 field armies and 2 Cavalry divisions (18 divisions, 6 auxiliary divisions, and 2 Cavalry divisions, about 450,000 men) specified in the report is:

Type.	Batteries for 6 armies and 2 Cavalry divisions.	Insular posses- sions.	Reserve.	Total batteries.	Total guns.
3-inch mountain howitzer.....	24	3	.....	27	108
3-inch field gun.....	156	12	27	195	780
3.8-inch field howitzer.....	30	.....	6	36	144
4.7-inch field howitzer.....	30	.....	5	35	140
4.7-inch field gun.....	12	1	2	15	60
6-inch field howitzer.....	12	1	2	15	60

2. The report of the board mentions a 10 per cent reserve for spare parts, but that additional quantity is not included in the figures above. It makes no provision for the supply of guns to replace those lost, destroyed, or worn out during a campaign.

3. Under the Treat Board, approved July 12, 1916, 13 field armies and 4 Cavalry divisions (1,024,796 men exclusive of troops for lines of communication, etc.) were provided for. This required the following artillery for equipment:

Requirements	Armies	10 per cent	Insular posses- sions	Total	Total guns
3-inch mountain howitzer.....	15	3	12	30	120
3-inch field gun.....	492	49	9	550	2,200
3.8-inch field howitzer.....	234	23	3	260	1,040
4.7-inch guns.....	78	7	6	91	364
6-inch howitzers.....	78	7	6	91	364
7.6-inch howitzers.....	52	5	6	63	252
11-inch howitzers.....	26	2	.....	28	56

4. The Ordnance Department table of requirements included the following additional quantities of matériel over that required for the mobile Army:

	Per cent.
For depot battalions.....	25
For recruit battalions.....	25
Reserve.....	40
Total.....	90

5. These amounts are not included in the above tables, which are taken from the Treat Board reports, but are necessary to cover losses by destruction, capture, ordinary wear, etc.

6. A field army under the Treat Board organization consisted of 3 Infantry divisions (3 regiments of Artillery to a division), 2 regiments Heavy Artillery, 1 regiment Siege Artillery, and auxiliary organization.

7. The war organization first prepared for the American Expeditionary Forces in France called for 20 combat divisions and 10 depot and replacement divisions and 8 brigades of Heavy Artillery. The Artillery required for equipment of Artillery troops exclusive of all spare and reserve matériel of one army only is:

75-mm. guns.....	1,224
155-mm. howitzers.....	576
4.7-inch guns.....	120
155-mm. guns.....	408
8-inch and 240-mm. howitzers.....	288

8. The guns for training of troops and replacement of war losses are in addition to the above. Roughly, 1½ guns to each gun with combat troops are required for those purposes.

9. An ordnance munitions board study has been based upon equipping 16 regular combat Infantry divisions and 1 Cavalry division and 16 National Guard Infantry and 1 Cavalry division and equipping 3½ combat divisions per month to take the field after six months of training. Under those conditions present stocks of artillery would meet requirements for the following months of warfare. Old matériel available for training purposes is included in this report: 75-mm. guns, 9 months; 155-mm. howitzers, 12 months; 4.7-inch guns, 8 months; 155-mm. guns, 1 month; 8-inch and 240-mm. howitzers, 2 months; 3-inch antiaircraft, less than 1 month; 4.7-inch anti-aircraft, 0.

Mr. SLEMP. As I understand it, you have enough guns of any of these types for a service test?

Gen. PEIRCE. No, sir; we have not.

Mr. SLEMP. Simply pilot mounts with designs to correspond to the best experiences of the war. You have the designs for those types?

Gen. PEIRCE. The design can not pass into the approved state until it has had a service test. We expect in the next two or three years to come before the committee and ask for an appropriation sufficient to make a few of the types approved, sufficient for the service tests.

Mr. SLEMP. Are you asking any money for service tests during the year?

Gen. PEIRCE. One item.

Mr. SLEMP. For the Field Artillery?

Maj. JENKS. Yes, sir.

Mr. SLEMP. Which one is that?

Maj. JENKS. The pack howitzer. We feel that the present design is sufficiently developed for this.

Mr. SLEMP. General, what army would the present Field Artillery that you have be able to equip under the organization as set forth in the reorganization act of June 5, 1920?

Gen. PEIRCE. I can not answer that question offhand.

PACK HOWITZER.

Mr. ANTHONY. I take it that the only thing you are asking money for to go into production on is this, the new light howitzer?

Gen. PEIRCE. The pack howitzer.

Mr. SLEMP. You have the pilot mounts, as you have stated here, but you have not the requirements for service test of any?

Maj. JENKS. No, sir.

Mr. SLEMP. You are asking for one next year?

Gen. PEIRCE. A pack howitzer.

Mr. SLEMP. You are asking money to build only for service tests and nothing for anything else?

Gen. PEIRCE. Yes, sir.

Mr. SLEMP. And in the future if the tests are satisfactory you might ask for quantity production?

Gen. PEIRCE. Yes, sir.

Maj. JENKS. The estimates call for five, four to go to the service for service test and one to remain at the proving ground for Ordnance Department use.

Mr. SLEMP. Have the tests which you have been satisfactory, so far as you have gone?

Gen. PEIRCE. On the pack howitzer?

Mr. SLEMP. Yes, sir; that is the only one you have tested.

Gen. PEIRCE. Yes, sir; I think it is in a proper status.

Mr. SLEMP. Did you get any results on the various types of mounts, tractors, etc.—what results did you have with the money so far spent?

Maj. JENKS. The tests have not gone far enough to draw final conclusions. Of course we have drawn some conclusions from our experience so far, but they are largely engineering conclusions. We have not yet obtained any practical conclusions on account of the fact that the tests have not been completed.

Gen. PEIRCE. In regard to that I might say this, that we do not look for satisfactory tests in these first efforts with the self-propelled mounts. They will be chiefly valuable as indicating promising lines of development which will have to be pursued beyond that, because the self-propelled mounts with caterpillar treads are a new development which will have to pass through quite an evolution, in my opinion, before they will have reached a satisfactory stage. It may be compared with the progress of development that the automobile has passed through.

The first types of automobiles would go, but they would not go very far and they were not very reliable. At the present time there are very satisfactory and very reliable types of automobiles that have been evolved. Some similar process of development will undoubtedly have to be passed through in the use of this equipment for the Army.

DEVELOPMENT OF TRACTORS.

Mr. SLEMP. To what extent have you motorized any of your regiments during this year?

Gen. PEIRCE. They are motorizing only with tractors. There are no self-propelled mounts yet in the service.

Mr. SLEMP. To what extent has that been done during this year?

Maj. MURRAY. At the present time there are seven regiments with the 155-millimeter howitzer, five with the 75-millimeter guns of the Field Artillery and also some Coast Artillery.

Maj. RUHLEN. There are three regiments of the 155-millimeter guns and three regiments of the 8-inch howitzer of the Coast Artillery Corps.

Mr. SLEMP. What about the tractor equipment?

Maj. MOODY. The 75-millimeter guns and the 155-millimeter howitzers are equipped with 5-ton tractors and the 155-millimeter guns and 8-inch howitzers are equipped with 10-ton tractors. There are also a few old 2½-ton tractors with the 75-millimeter regiments.

Mr. SLEMP. Last year you said that you were working on a smaller tractor, a 2½-ton tractor, that would ford a river, be submersible, etc.; what was the result of that experiment?

Maj. MOODY. That type is at the Aberdeen proving ground. That undoubtedly will need considerable revamping. Nothing like that has been built. It is a question of development. It appears to be an excellent preliminary model. That is one item that justifies us in asking for service tests next year.

Mr. SLEMP. You have one of those?

Maj. MOODY. Yes, sir; as a matter of fact, two of them have been built.

Mr. SLEMP. Two and one-half ton tractors? Have you motorized any units of the self-propelled mount types or do you contemplate doing so; if so, what?

Maj. MOODY. Under this year's program eight 155 millimeter caterpillar mounts, Holt type, and four 155 milimeter caterpillar mounts, Christie type, have been or will be issued to the service for service test. Single pilot matériels are being sent to service boards for preliminary tests and there will be more of these next year. No more are available, however, for equipment of any service organizations.

Mr. SLEMP. Referring to motorization of Field Artillery, please insert in the record a statement of the relative cost of upkeep of motor-drawn and horse-drawn vehicles.

(The statement requested follows:)

Difference in cost per year of horsed and motorized 75 millimeter Artillery regiments.
[Guns and ammunition vehicles only considered. Saving greater if miscellaneous vehicles also considered.]

	Horsed.	Motorized.
Horses.....	672	.....
Tractors.....		72
Depreciation in original cost per year:		
Horses.....	¹ \$23,520	² \$48,000
Harness.....	³ 25,200	.....
Forage and fuel.....	⁴ 109,138	⁵ 13,478
Maintenance.....	⁶ 86,400	⁷ 43,920
Total.....	244,258	105,398
	105,398	.....
Difference.....	138,860	.....

¹ Cost of horses taken at \$210 each and active service life 6 years.
² Cost of tractor taken at \$4,000 and life assumed to be 6 years; no salvage value considered.
³ Cost of harness taken as \$75 per draft animal and life 2 years.
⁴ Cost of forage per month per animal, \$13.534.
⁵ Assumed average of 5 miles per day for all tractors and actual cost of gas, oil, and grease is 12 cents per mile. The cost of animal transport is not reduced by enforced idleness.
⁶ Charged to the maintenance of the horses is only the pay and subsistence, taken at \$50 per month, per man of the minimum of 2 men per tractor saved by using tractors. Veterinary charges, cost of 3 months' training at remount depots, etc., not included.
⁷ Maintenance per tractor, per annum, figured at \$610, which is believed to be very high, as two men per tractor are allowed as drivers and should be able to do all work except that requiring special skill.

Maj. MOODY. Slightly more than that. We call them 2½-ton tractors.

MOUNT FOR 16-INCH HOWITZER.

Mr. SLEMP. You did not spend any money on the 16-inch howitzer mount, did you?

Maj. JENKS. We placed an order during the fiscal year 1920 for the tipping parts of the 16-inch howitzer to be adapted to the 14-inch railway mount, so we could fire the 16-inch howitzer from the 14-inch gun mount, and that is under manufacture.

Mr. SLEMP. When do you expect the delivery of that?

Maj. JENKS. About the end of this fiscal year.

Mr. SLEMP. Do I understand you to say that these 14-inch guns are transferred to D. F. G.?

Maj. JENKS. Yes, sir.

Mr. SLEMP. How long will it be before you will complete the three 14-inch railway mounts that you are speaking about?

Maj. JENKS. The estimates submitted were based upon the completion of those in the fiscal year 1923.

Mr. SLEMP. Looking at your estimates for this year under B, how much of that was A?

Gen. PEIRCE. \$1,905,270; B, \$1,711,554; and C, \$366,176.

FOR COMPLETION OF PILOT ARTILLERY MATÉRIEL.

Mr. SLEMP. Will you make a statement as to your A money?

Gen. PEIRCE. You mean under the different projects?

Mr. SLEMP. Generally, yes.

Gen. PEIRCE. Under the head of continuation of old work, experimental and development work, we have an A item of \$255,000 for the completion of pilot artillery matériel now in process of manufacture under current funds, including calibers up to and including 155 millimeter guns and 8-inch howitzer calibers.

Mr. SLEMP. Just what are those?

Maj. JENKS. Those are the items we have been speaking of that have already been ordered, which are under manufacture, and we estimate we will not have sufficient funds to complete the assembly of them and that funds will also be required on account of breakages and alterations required during tests. This amount includes all of those calibers and different models and covers the work we have to do next year in assembling them, in repairing them, and maintaining them during tests.

Mr. SLEMP. Which ones will not be delivered on the 1st of July?

Maj. JENKS. The 75 and 105 box trails will be delivered about the 1st of July, and we hope to send them to the proving ground about that time; the 4.7-inch gun matériel and 155-millimeter howitzer matériel will probably not be assembled for shipment to the proving ground until after the 1st of July; we hope to complete the machine work by that time; the same thing is true of the 155-millimeter gun matériel; the 8-inch howitzer matériel—that is, wheel mounts; the 4.7-inch gun and the 155-millimeter howitzer caterpillar mounts will not be completed until after July 1. The 155-millimeter gun and 8-inch howitzer caterpillar mounts—that is, the mounts themselves—should be completed by the 1st of July, but the gun and gun mount will not be assembled to them and all parts brought together until after the 1st of July. The same thing is true as to the 3-inch and 4.7-inch antiaircraft matériel.

Mr. SLEMP. I wish you would put into the record the cost of each unit when delivered to the Government.

Maj. JENKS. The estimated costs are the following. It is impossible to give actual costs at this time. This covers pilots of experimental designs:

75 mm. gun and wheeled mount.....	\$75,000
105 mm. howitzer and wheeled mount.....	75,000
4 7-inch gun and wheeled mount.....	150,000
155 mm. howitzer and wheeled mount.....	150,000
155 mm. gun and wheeled mount.....	180,000
8-inch howitzer and wheeled mount.....	180,000
3-inch antiaircraft gun and caterpillar mount.....	150,000
4.7-inch antiaircraft gun and caterpillar mount.....	175,000
75 mm. gun and caterpillar mount.....	100,000
4.7-inch gun and caterpillar mount.....	170,000

240 mm. howitzer and caterpillar mount.....	\$250,000
Infantry howitzer.....	25,000
Pack howitzer.....	60,000

If manufacture for service test or for production were undertaken, the cost would be less, depending upon the quantity ordered

Mr. SLEMP. It seems to me that is a pretty expensive cost when you give the major cost to be assembling.

Maj. JENKS. You mean——

Mr. SLEMP (interposing). I mean looking at this thing from the standpoint of what you get. You spent this money during this fiscal year and during the preceding fiscal years and you have these guns, with their accessories, practically ready for delivery, and then you ask for \$255,000, most all of which is to be spent on assembling.

Maj. JENKS. Not only on assembling, sir.

Mr. SLEMP. How much on assembling?

Maj. JENKS. I can not give a detailed estimate of just how much is for assembling, although I could get those figures up for you. But this also includes the replacement of broken parts or parts which are found defective during firing tests and the completion of the work.

Mr. SLEMP. I think we all ought to get away from this business that we are all engaged in as quickly as possible and get down to very definite types of guns. It seems very hard to clean up anything.

Gen. PEIRCE. I quite understand your position, but it must be remembered that most of these types are among the developments not only of wheel types but also caterpillar types and self-propelled types, so that there is an apparent duplication of effort which is not really a duplication, because we are simply trying to find out which of these different combinations will prove to be the most effective in actual use, and as soon as that point is determined the other types will be dropped.

Mr. SLEMP. You have no more than general information about that \$255,000?

Maj. JENKS. That is almost impossible because we can not foresee, for example, exactly where we are going to run into trouble; we know we are going to run into trouble on numerous things and we know we are going to have breakages, but just what we are going to have trouble with we can not tell.

Mr. SLEMP. Take up your next item, General.

MISCELLANEOUS DEVELOPMENT WORK, INCLUDING WORK ON MUZZLE BRAKES, ETC.

Gen. PEIRCE. The next item is for miscellaneous development work, including work on muzzle brakes, recuperators, fire-control matériel, ballistics, aircraft armament, etc., an A item, \$144,000.

Mr. SLEMP. Colonel, what have you to say about that?

Maj. JENKS. That includes \$30,000 for the development of muzzle brakes. There is one shown on that photograph of the 4.7-inch antiaircraft gun, and the purpose is to take up a part of the energy on the recoil of the gun so that less work is thrown upon the recuperator system. We are now attempting to use that on the 4.7-inch antiaircraft gun and also on the 75-millimeter pack howitzer, and we desire to develop it for a larger caliber gun so as to cut down our carriage weights, recuperator weights, and costs.

Mr. SLEMP. Is that a war discovery?

Maj. JENKS. No, sir; the muzzle brake was used in another form 20 years ago, and even longer ago than that, but it has never been successfully applied.

Mr. SLEMP. Were the ordinary 75's equipped with it?

Maj. JENKS. No, sir. We would like to use it on railway artillery, if possible. Then, we have an item of \$10,000 for the development of the Holmes system in recuperator, which consists of an air spring to take the place of the standard pneumatic recuperator, which was developed by the French and adopted by ourselves; \$35,000 on fire-control work, which includes miscellaneous work, like the development of range finders, telescopes, etc. We have been able to do very little work on that this year on account of the lack of personnel. Exterior and interior ballistic work, \$20,000. That is for the continuation and development of those items, so far as affects the gun. For example, we are having considerable difficulty, due to our lack of knowledge, as to exactly what happens in the gun. We have blown up guns which were produced during the war and all of our investigations do not show exactly what happened; that is, what caused the rupture of the gun, and we desire to investigate more fully the exact conditions that take place in the gun.

Mr. ANTHONY. You have found that certain of the guns which were developed during the war were defective?

Maj. JENKS. Yes, sir. We have had particular trouble with the 240-millimeter howitzer. I should say, however, that the metal was not defective, but there is something—we do not know exactly what—which caused a rupture of the gun.

Mr. ANTHONY. Is that the 8-inch gun which was made in England?

Maj. JENKS. No, sir; that is the 240-millimeter howitzer, which is of French design.

Mr. ANTHONY. I was told when I was at Fort Sill that the 8-inch howitzers, which were made in England, were very dangerous; that some had blown up down there and when they fired them everybody got under cover.

Maj. JENKS. That was due to defective ammunition.

Mr. ANTHONY. And not the gun?

Maj. JENKS. No, sir.

Mr. ANTHONY. What class of gun is it that you speak of as being found defective?

Maj. JENKS. That was the design of the larger howitzer, the 240-millimeter howitzer, with which we have had trouble due to the gradual expansion of the muzzle end of the gun under ordinary pressures.

DEFECTIVE AMMUNITION.

Mr. ANTHONY. What do you do with the ammunition you find defective; do you have to condemn it?

Col. RUGGLES. We are still investigating the cause of this trouble at Fort Sill. There are two causes; one is the fuse, which is a French type of fuse, and which all during the war was known to be dangerous, but with which we are equipped, unfortunately. The French are now prohibiting target practice with that fuse. That is part of the trouble. Another part of the trouble is the hastily made high

explosives during the war, when we could not wait for the utmost refinement, and that holds good as to the English and French ammunition, as well as our own, so that a considerable part of that ammunition is in a bad state in all countries.

Mr. ANTHONY. Where was the defect—did the shell explode in the gun?

Col. RUGGLES. Yes; as I say, some of the trouble was due to the fuse and no doubt some due to the filler. That is a condition that occurs in all the ammunition used by the Allies, and we are no more unfortunate in that respect than either the English or the French. We are investigating that and trying to overcome that. Our people do take cover, as you say, but they are no different in that respect from the French, who even go further than we do, and will not let them use that ammunition at all in target practice.

Gen. PEIRCE. Answering your question specifically, when loaded ammunition is found to be defective and dangerous it is not only withdrawn from the service but it must be destroyed, as there would be no way to repair it, that is, when the shell is actually loaded with explosive.

Mr. SLEMP. What amount of money did you say you were asking for that?

Maj. JENKS. For exterior and interior ballistic work, \$20,000.

Mr. SLEMP. How do you get at a specific sum of money for these investigating propositions?

Gen. PEIRCE. That is simply an effort to indicate the probable division of the estimate along certain lines of work for your information.

Mr. SLEMP. That is, you would employ so many men and pay so much for the design? What I mean is, how do you arrive at \$20,000 as the amount? Why do you not make it \$30,000 or \$10,000?

Gen. PEIRCE. It is not a mathematical estimate but it is the best estimate that can be made, based upon experience, as to about how much will be necessary. It is not an estimate in the sense that we put in an estimate for the cost of building a structure of a definite size and known construction.

METALLURGICAL INVESTIGATION.

Maj. JENKS. There is an item of \$24,000 for metallurgical investigation. That is for the investigation of steel, gun forgings, recuperators, and various other propositions.

Mr. SLEMP. You will not need that, will you?

Maj. JENKS. We could easily use more than that.

Mr. SLEMP. Where would that work be done?

Maj. JENKS. This would include the services of metallurgical engineers in Washington and also include some experimental work done at arsenals and other places.

Mr. SLEMP. Including the Bureau of Standards?

Maj. JENKS. Yes.

Col. RUGGLES. Some work would be done there but it would not be paid for from their own funds; when we get work done there we have to pay for it, as their appropriations are not big enough for them to do our work.

SERVICE TEST OF EXPERIMENTAL AND FOREIGN TYPES OF MATÉRIEL.

Maj. JENKS. \$25,000 is to cover a service test of experimental and foreign types of materiel as a part of the program of development.

Mr. SLEMP. Where would that test be made?

Maj. JENKS. Wherever the Chief of Artillery would assign the work, but probably at Fort Sill.

Mr. SLEMP. What particular foreign types have you in mind?

Maj. JENKS. For example, we have the British 18-pounder, which we hope to send out to the service shortly.

Mr. SLEMP. How many have you?

Maj. JENKS. We have two; and then just as fast as the proving-ground tests are completed we will send out some of these experimental materials in order to get the preliminary service test.

Mr. SLEMP. That would be an ammunition proposition, would it not?

Maj. JENKS. No; we have to pay out of this for the service, maintenance, etc., of these various pieces; in addition, we must furnish repair parts. Then there is an item of \$30,000 for the development of aircraft armament of about 75-millimeter caliber for bombardment purposes.

Mr. SLEMP. Does that go on the airplanes?

Maj. JENKS. Yes, sir; but it is the responsibility of the Ordnance Department to develop it.

Mr. SLEMP. That is not a gun, but a bomb?

Maj. JENKS. No, sir; it is a bombardment gun.

Mr. ANTHONY. To be carried in an airplane?

Maj. JENKS. Yes, sir.

Mr. SLEMP. What is the size of that gun?

Maj. JENKS. About 75 millimeters; the gun itself will be about the same as a pack howitzer.

Mr. ANTHONY. What is the idea of a bombing gun? Does that mean you could fire a bomb with more accuracy than you could drop it?

Maj. JENKS. Yes, sir. It would be used as an offensive gun against other planes or similar targets.

Mr. SLEMP. You now have some attack planes which carry these 37-millimeter cannon?

Maj. JENKS. Yes, sir.

Mr. SLEMP. And you want to get a larger type? You do not have any 3-inch guns on them, or do you?

Maj. JENKS. The Air Service is experimenting with a 75-millimeter pack howitzer at the present time.

Col. RUGGLES. The French used a 75-millimeter gun on an airplane toward the end of the war.

Mr. SLEMP. What else have you under that item?

Maj. JENKS. That is the total of that item.

Mr. SLEMP. Take up the next item.

DEVELOPMENT OF PILOT TRACTORS, CAISSONS, MOBILE SHOPS, ARMOR PLATE, ETC.

Gen. PEIRCE. The next item is for the development of pilot tractors, caissons, mobile shops, armor plate, etc.

Mr. ANTHONY. General, if you want to make continued experiments in tractors that show that you have not yet found the types of artillery tractor that you think is efficient.

Gen. PEIRCE. No, sir.

Mr. SLEMP. How much did you spend on that development work this year?

Maj. MOODY. I have that in a little different form. The total which will have been allotted and the majority of which will have been spent by June 30, 1921, is \$478,256; that is the amount spent out of the funds appropriated last year, and the total amount from all other sources previous to that is \$387,889.

Mr. ANTHONY. Are we going ahead and motorizing certain of the artillery organizations with tractors that were left over from the war, or are we buying a new type of tractor?

Maj. MOODY. The general statement made in regard to guns applies, I think, entirely to tractors. We are using and expect to use in the service those tractors left over from the war, and if we should unfortunately get into another war we will use what we have on hand to start with. But the types are obsolescent in that they were developed hurriedly, either just before or during the war, and do not measure up in any way to present standards.

Mr. ANTHONY. Are all of the tractors left over from the war in the care of the Ordnance Department?

Maj. MOODY. Yes, sir.

Mr. ANTHONY. How many of them are there?

Maj. MOODY. There are 6,462.

Mr. ANTHONY. All designed for artillery purposes?

Maj. MOODY. Yes, sir.

Col. RUGGLES. They are not very satisfactory tractors; they are giving a great deal of trouble in the service.

Mr. ANTHONY. Were they developed from the agricultural tractor?

Col. RUGGLES. Yes, sir; we took that as the type and made a few modifications.

Mr. ANTHONY. If they are obsolescent and are not suitable for your purposes why would it not be a good plan to sell those you have for agricultural purposes and build some better ones?

Gen. PEIRCE. The answer to that is that they are usable. If we could sell them and then replace them with more modern tractors it would be well to do it, but the expense of replacing them with modern tractors would be rather heavy. We have these and we are not sure about getting any more.

Mr. SLEMP. In addition to that you have not yet developed the type of tractor you want.

Gen. PEIRCE. Not that we would attempt to manufacture in quantity.

Col. RUGGLES. The tractors must be three or four times as fast and must not make any noise; in addition, they must be more reliable than those we have.

Mr. SLEMP. Have you put in the record a statement showing what you have received for the \$700,000 that you are expending during this fiscal year?

Maj. MOODY. No, sir; I have not. I have a statement showing the status of the development in general; we went into great detail before the committee last year, and stated that we were proceeding

under the program of the Westervelt Board. We gave the total cost, as best we could estimate, of the final completion of the motorized development. The estimated total of that program was \$2,125,000, but a revision of that has reduced that to \$1,826,187, and we hope that next year we can report some further reduction; but I would not want to promise because it is too uncertain. We have allotted certain sums of money to the various projects and have estimated the amount which we expect will be necessary to complete the work and also the amount which we would like to have next year. The actual results in vehicles running are not as good as they are with artillery, but the money is going to be expended from now until June 30 at a much higher rate than it was before. The reason for that is that we held back these designs just as long as we could in order to be sure that our first experimental vehicles would be of the best design that we could build.

Mr. SLEMP. Will you get any tractors?

Maj. MOODY. We actually have one running.

Mr. SLEMP. What is that type?

Maj. MOODY. That is a 2½-ton tractor.

Mr. SLEMP. How many of those have you?

Maj. MOODY. We have two actually running.

Mr. SLEMP. They have gone through a test?

Maj. MOODY. No, sir; they are just now being sent to Aberdeen for a test. We have a trailer caisson, to be drawn behind tractors, and we have one of those running at Aberdeen; we have a design for a tractor for corps artillery, which would be about a 7 or 8 ton design, practically completed. The order has been placed for construction, and, with good luck, will be running by the end of June, but if not the funds which we have allotted will carry over and the construction will run on into next year, but from funds which have been allotted and which we are not now asking the committee to appropriate.

Mr. SLEMP. That money will have to be expended by the 1st of July or it will lapse.

Maj. MOODY. No, sir; it carries over into 1921, and it is possible that some of the money from 1921—that is, money appropriated last year—will not be expended by June 30, because we have not hesitated to slow up the work where we thought we were making any mistake. The figures I gave and which Col. Jenks gave were on the assumption that all will be expended by June 30, and if things move as rapidly as they are moving now it will be; but it is impossible to tell whether any will be carried over or not. A tractor for Army artillery is actually under construction at the Rock Island Arsenal, and should be finished by June 30.

Mr. SLEMP. What weight is that?

Maj. MOODY. That is about 15 tons. Then there is a small vehicle, known as the reconnaissance tractor, being constructed for replacing the individual horse, the motor cycle, and things of that sort, and that, I think, will be a pretty good machine.

From the first preliminary models of that, we do not expect to get more than the engineering data, and some parts of the first model were left purposely defective in order to save funds, or we improvised them out of matériel on hand. Item No. 13 is a hand-drawn caterpillar cart, and that development we consider complete. There has

been a certain amount of experimental work under Item 16, covering experimental and development work not on specific items, one item of that being the development of an air-cooled engine. In that we made an experimental cylinder which did not cost very much, and on the basic data we will be able to go ahead with the construction of an air-cooled engine. There are a number of other small items that have been handled in the same way. No. 17 covers light armor plate, on which there has been a certain amount of development work done. The indications are that they are doing quite well with that development. Last year the estimate carried four different types of tractors, but which we have combined into three, with a considerable saving resulting.

Mr. SLEMP. Generally speaking, the types you are working on are the 2½ ton and 15 ton tractors?

Maj. MOODY. And there is one in between, or the 7-ton tractor. I think we have given them better names than we had last year. We call them the divisional, corps, and Army types.

Mr. SLEMP. The divisional is what?

Maj. MOODY. That would be the 2½-ton to match the 75-millimeter gun; the corps will be the 7-ton, matching the 155-millimeter howitzer, and the Army would be the 15-ton, matching the very heavy types of mobile artillery.

Mr. ANTHONY. Is there any commercial type of tractor made that suits the purpose of drawing field artillery?

Maj. MOODY. There is no type that meets what you might call the ideal requirements. We are keeping our eyes on the commercial field, and we have hopes ultimately that we will arrive at a status where commercial types will be suitable.

Mr. ANTHONY. Is your development work entirely along the line of caterpillar tractors?

Maj. MOODY. For cross-country work we need the caterpillar and the work is entirely along the line of the caterpillar type. The caterpillar track itself as now developed will not stand the speed of trucks, as you know if you have seen any of them; so in building new tractors we are making the engine, transmission, rear axle, etc., on the assumption that we have a vehicle that will run as fast as the motor truck. Therefore, when the ideal track is developed, which is not in sight now, we will not have to build the whole vehicle over, but we will simply build the track. There are two lines of development in that regard, one of which is the straight caterpillar track, and the other is the combined wheel and caterpillar track, of which the principal exponent is Mr. Christie. Any of those new tractors when built will be so constructed that we can use it both ways.

Mr. ANTHONY. Will the caterpillar tractor take a field gun over any sort of ground that a horse could drag it over?

Maj. MOODY. Yes, sir. In any case, there are conditions either on the side of horses or on the side of tractors. You can always work up certain special conditions. In going across country, the tractor will take it wherever horses will go, and it will take it over a great many places where horses can not go. For example, it can take it across railroad trestles.

Mr. ANTHONY. If you take the average cultivated field in this country, and especially in the spring of the year, it gets in such a soft condition that horses will sink almost up to their bellies in going across. Could a caterpillar tractor traverse that sort of ground?

Maj. MOODY. Yes, sir. On that type of ground, it is entirely a question of the unit ground pressure. Assuming that a horse is standing on three feet, the pressure under his feet is about 16 pounds to the square inch, whereas in the case of the caterpillar of all the types that we are building now, the ground pressure would be about 4 pounds to the square inch, or less. In some of the smaller types it is down as far as 2 pounds to the square inch. In other words, the vehicle with this ground pressure ought to be eight times better than horses.

Mr. ANTHONY. I was just going to make the observation that at certain times of the year you might not be able to use caterpillar tractors because the ground would be too soft, and I was wondering if the Army would not find itself equipped with tractors that could not be used at certain times of the year.

Maj. MOODY. That was one objection to the commercial caterpillar.

Gen. PEIRCE. We would not be any worse off than if we had horses.

Mr. SLEMP. As I understand it, you can take these tracks off and run your tractor on wheels?

Gen. PEIRCE. Yes, sir; that is the Christie type.

Maj. MOODY. These two photographs are of the same ground but, as you will see, the caterpillar is operating under more difficult conditions.

Mr. SLEMP. The Government has no place for manufacturing these tractors?

Gen. PEIRCE. It has no plant especially for that. We can manufacture them, and expect to do some little work at Rock Island, but we are endeavoring to utilize the experience of both the Holt Co. and of Mr. Christie.

Mr. SLEMP. And also to give them some little lift in their commercial development?

Gen. PEIRCE. On this we work along together naturally. The military requirements will be generally more severe in certain directions than the commercial requirements will be, but any commercial experience will be valuable in designing artillery tractors.

Mr. SLEMP. Have you put in the record a statement of what motorization has taken place this year in the Army?

Gen. PEIRCE. Yes, sir; that was put in.

Mr. SLEMP. You have no request for that next year?

Gen. PEIRCE. It would be only a question of utilizing tractors——

Mr. SLEMP (interposing). You have no request for any money for that?

Maj. MOODY. No, sir; there is another item for manufacturing for service tests. I do not believe you have come to that.

Mr. SLEMP. That completes the old work?

Gen. PEIRCE. Yes, sir; and we have similar items under new work.

Mr. SLEMP. Apparently you are asking for new work divided between pilot artillery matériel and tractor development, \$1,500,000.

The original total was \$1,983,000. That is reduced under A items to what?

Gen. PEIRCE. Under item 4, A is \$1,483,000.

Mr. SLEMP. You have cut that about two-thirds?

Gen. PEIRCE. The original estimate was \$1,500,000.

Mr. SLEMP. You think you can get through with \$1,483,000?

Gen. PEIRCE. Yes, sir.

Mr. SLEMP. What would you do with that \$1,483,000?

Maj. JENKS. The item which was mentioned a few minutes ago covers the completion of pilots now under manufacture. As a part of the program of settling upon a suitable model of gun and mount for future manufacture in case of necessity, it is necessary to build some pilots in addition to those now in production.

Mr. SLEMP. What pilots do you want?

Maj. JENKS. The estimated amount next year covers one 75-millimeter split-trail matériel, estimated to cost \$75,000, of which \$30,000 is included for next year. That will be a split-trail mount. The next is a 4.7-inch gun, estimated to cost \$150,000, of which \$60,000 is included for next year; one 155-millimeter howitzer, estimated to cost \$150,000, of which \$25,000 is requested for next year; one 240-millimeter caterpillar matériel, estimated to cost \$250,000, of which \$100,000 is included for next year.

Mr. SLEMP. Is that a tractor?

Maj. JENKS. Yes, sir.

Mr. SLEMP. That includes the mount, gun, and all?

Maj. JENKS. Yes, sir. The next item is two infantry howitzers, estimated to cost \$50,000, all of which is included for next year; one 3-inch antiaircraft type, \$150,000, of which \$30,000 is included for next year; one 75-millimeter caterpillar matériel, estimated to cost \$100,000, of which \$40,000 is included for next year; one 4.7-inch caterpillar matériel, estimated to cost \$170,000, of which amount \$70,000 is included for next year; two auto frettage guns, estimated to cost \$50,000, of which amount \$30,000 is included for next year.

Mr. SLEMP. Is that frozen construction?

Maj. JENKS. No, sir; that is a gun in which the ordinary shrinkage strains are introduced by the application of interior hydraulic pressure. The next item is miscellaneous work, estimated to cost \$20,000, and the whole amount is included for next year. The last item is one 105-millimeter howitzer redesigned, \$25,000, and for which \$25,000 is requested for next year.

Mr. SLEMP. That totals how much?

Maj. JENKS. \$1,500,000.

Mr. SLEMP. You want one-third of that this year?

Maj. JENKS. Yes, sir. That \$1,500,000 includes four additional items upon which we will not be able to do any work next year on account of the lack of personnel, but which will come up in the estimates at some future time.

Mr. SLEMP. Would it not be well to stop that work and do this old work first, so as to get our conclusions, without going into anything new, in view of the fact that there are various models of the 75-millimeter and other guns that you are experimenting with and developing in connection with the item you have just discussed?

Gen. PEIRCE. We are endeavoring to cover in a period of three or four years all the development work that is laid out in the Wester-

velt Board project, and it is considered as very pressing and very necessary work. This is an attempt to carry it on under the head of old work. It is to wind up what we have started, and under the item coming under new work we take up items which we have not yet started.

Mr. SLEMP. The situation with regard to the old work is this: You have not made tests to determine whether you would want to make any of the devices that you are now bringing to condition.

Gen. PEIRCE. That is true.

Mr. SLEMP. That is a clear proposition. Had we not better hold up on these other things until we determine that question? You may want to use money on some other types that you are now spending money on, rather than on new types.

Gen. PEIRCE. I do not think that it would be well not to begin any work on these other types.

Mr. SLEMP. We would not lose anything if we did not, would we?

Gen. PEIRCE. We would lose time.

Mr. SLEMP. That is all you would lose, is it not?

Maj. JENKS. We would also lose our organization.

Mr. SLEMP. You would not lose your organization, because that organization is not on any new work.

Maj. JENKS. I mean by that the special organization of engineers capable of designing.

Mr. SLEMP. What is the next?

Maj. JENKS. That covers all the items.

Gen. PEIRCE. We have the same classification right through on every item, or in most all of those items the same classification is presented. That is to say, we itemize the continuation of the old development work, or that which has been started, and we itemize the new development work.

Mr. SLEMP. I think what you have done is fine so far as presenting information to the committee is concerned. It is very clear, and we get a good picture of it. We thank you for it.

Gen. PEIRCE. The reasons for desiring to continue to take up new development work next year, as well as the continuation of that which has not yet been finished, are, first, the loss of time that would result if we did not take it up, and, second, the loss of organization which would follow because there would be no design work to put them on.

Mr. SLEMP. Of course, we are facing the proposition that we have artillery on hand enough to equip an army of, perhaps, 1,000,000 men; we are well supplied with all kinds of field artillery of the best type available in use when the war closed, and now we are not estimating here, as I see it, for any guns or matériel of any kind to be used by troops in any way.

Gen. PEIRCE. Except in one or two cases, for a service test only.

Mr. SLEMP. A lot of your requests that come under B are for either the continuation of development——

Gen. PEIRCE (interposing). No, sir; there is one item for repair and maintenance.

Mr. SLEMP. Do you have repair and maintenance under this item also?

Gen. PEIRCE. Yes, sir.

Mr. SLEMP. I thought that came in later. You have covered the 75-millimeter pack howitzers; and for the manufacture of tractors and caissons for divisional, corps, and Army artillery for service tests you are asking how much?

Maj. MOODY. \$352,500.

Mr. SLEMP. How many of these do you expect to have in your program?

Maj. MOODY. We have under divisional tractors 13 with which to equip one battery.

Mr. SLEMP. Of what type.

Maj. MOODY. Two and a half ton. There are 11 tractors for one battery, and there will be two for other purposes. One of them will probably be for the Artillery school of fire at Fort Sill, and probably one for the ordnance-firing test at Aberdeen. The next item is for sufficient divisional trailer caissons to equip one battery; the next is for sufficient Army tractors and trailer caissons to equip one platoon—seven Army tractors and six Army trailer caissons of 3 tons; and the next is 15 reconnoissance tractors.

These are desired by several branches of the service; but the distribution, I think, would probably be about 10 for the Field Artillery, 2 for the Coast Artillery, 1 for the tanks, 1 for the Infantry, and 1 for the Ordnance Department. The War Department would settle the distribution at the time.

Mr. SLEMP. Are those that you want here for the respective uses of accepted types?

Maj. MOODY. No, sir; the status is the same as with the guns. The pilots are either running or will be running about June 30. Our feeling is that on these three items we would have sufficiently definite data and the vehicles would be sufficiently well tested to warrant construction for service tests during the coming year.

Mr. SLEMP. Which is the most important of these items?

Maj. MOODY. I should say that they are all regarded as of equal importance. Probably if there are not sufficient funds available to equip a complete unit it would be desired to complete a smaller number of each.

Mr. SLEMP. What is the unit cost of each, respectively?

Maj. MOODY. The unit cost of the 2½-ton tractor is estimated at \$9,000 in these quantities; for the trailer caisson the unit cost is \$3,000; for the Army tractor the unit cost is \$15,000; and for the Army trailer \$5,000; and the unit cost of the reconnoissance tractor is \$3,500. That is probably as cheap as they could be made for service tests. Of course, in war quantity production the cost would be greatly reduced. In smaller numbers of, say, three or four the unit cost would go up somewhat. These are the three major items of the whole Westervelt Board project for the development of tractors now recommended for service test.

JIGS AND FIXTURES.

Maj. JENKS. The next item covers repair and preservation of manufacturing facilities and is the work of compiling methods of manufacture that were used by the principal contractors. That includes putting jigs, fixtures, and gauges into a condition of storage so as to protect them against deterioration.

Mr. SLEMP. You asked for \$100,000 for that purpose last year, and, as I remember it, you stated that you would get through with that work by the 1st of July.

Maj. JENKS. Yes, sir; last year we hoped to get through by the 1st of July, but it is a bigger proposition than we had any idea of. We are actually expending \$140,000 on that this year, with no hope of cleaning it up.

Mr. SLEMP. This involves all of your jigs, fixtures, and gauges proposition for manufacturing, that material being retained by the Government?

Maj. JENKS. Yes, sir; for artillery material.

Mr. SLEMP. Do we need all of it? If I understand it, you take all of these pieces, separate them, catalogue them, and put them into little boxes?

Maj. JENKS. We are retaining only those for what is considered standard material and which would be produced in case we went into production immediately or within the next few years. Anything of excess capacity we have salvaged.

Mr. SLEMP. When will you expect to get through with this?

Maj. JENKS. I hope that in the matter of jigs, fixtures, and gauges to complete the permanent storage of them by the 1st of January, but I do not know whether we can do that or not.

Mr. SLEMP. Do you not have a report from some officers of the department in regard to this material that would give you some light on that subject?

Maj. JENKS. Based upon the number of men we have now employed on this work and the amount of material now in sight, we can probably complete it by the 1st of January.

Mr. SLEMP. Where are you storing the jigs, fixtures, and gauges?

Maj. JENKS. At the arsenals which are manufacturing similar material.

Mr. SLEMP. Where you preserve the facilities for manufacturing the various types of guns?

Maj. JENKS. Yes, sir.

Mr. SLEMP. What are the Government facilities that we are now preserving for future use, and where are they located? At what arsenals are they located?

Maj. JENKS. We have facilities for manufacturing guns at Watervliet Arsenal, and two other plants under the control of the Watervliet Arsenal, one at Rochester, and the other at Erie, Pa. For the manufacture of recuperators we have a plant at Rock Island Arsenal for all sizes up to the 156-millimeter gun and the 8-inch howitzer.

Mr. SLEMP. The Rochester and the Erie plants are simply maintenance propositions, are they not?

Maj. JENKS. We are not operating them. They are in stand-by condition.

Mr. SLEMP. What does it cost the Government to keep guard over those plants?

Maj. JENKS. Our estimate for next year, I think, amounts to about \$30,000 for both plants. I am not positive about that, however.

Mr. SLEMP. Those three plants are the only plants you are retaining outside of the arsenals; that is, the plants at Rochester, Erie, and Chicago?

Maj. JENKS. Rochester and Erie are the only ones for the manufacture of guns and carriages. There are other plants for the manufacture of other types of ordnance material.

Mr. SLEMP. Still retained by the Government?

Maj. JENKS. Yes, sir.

Gen. PEIRCE. There is one for the manufacture of ammunition at Chicago?

Mr. SLEMP. Are any of them in use outside of the arsenals?

Maj. JENKS. No, sir.

Mr. SLEMP. To what extent are the commercial people who manufactured guns preserving their facilities?

Maj. JENKS. The only commercial people who are preserving their facilities are those that were equipped with facilities before the war—Bethlehem, Midvale, and the Driggs Ordnance Co.

Mr. SLEMP. Are they preserving their jigs, fixtures, and gauges for manufacture?

Maj. JENKS. I do not think they are preserving their jigs and fixtures which were used on special ordnance contracts.

Mr. SLEMP. But you do not know about that?

Maj. JENKS. It was not their policy.

Mr. SLEMP. Do you think it would be advisable to give commercial organizations contracts for manufacturing guns, in order to keep them in shape for building guns, if we had the money?

Gen. PEIRCE. I think so, if we had the money. I think the more knowledge of production of ordnance material we can keep alive throughout the country the greater measure of preparedness we would have.

Mr. SLEMP. The Government manufacturing facilities would produce guns of what character and at what rate?

Gen. PEIRCE. All sizes of guns. The rates would naturally depend upon how many calibers were in process at the same time. We have those figures and can give them to you.

Mr. SLEMP. There has been an enormous amount of money expended at these arsenals. I should say there has been anywhere from 400 to 500 per cent increase.

Gen. PEIRCE. At some of them, and we have a greatly increased capacity as a result.

Mr. SLEMP. Give us a general statement of that for the record.

Maj. JENKS. The amount expended at the arsenals gives us a capacity for guns and recuperators for divisional artillery at the rate of 360 per month and nothing for the manufacture of carriages outside of the recuperators: For the 155-mm. howitzers and recuperators, 200 per month; the 4.7-inch guns, 100 per month; the 155-mm. guns, 60 per month; and the railway artillery, 4 per month.

Mr. SLEMP. Where is that made, at Watertown?

Maj. JENKS. Yes, sir.

Gen. PEIRCE. The guns were made at Watervliet.

Maj. JENKS. We have not the gun capacity for all the railway guns, we have a capacity of about 17 per year and of the 16-inch guns per year.

Mr. SLEMP. That is Government capacity?

Maj. JENKS. Government capacity; yes, sir. Those are the capacities for existing types and designs of material.

Mr. SLEMP. Is that on the assumption that the jigs and fixtures are already in place for the production?

Maj. JENKS. Yes, sir; on the assumption that we have all the necessary facilities required for manufacture.

Mr. SLEMP. I notice that you make no estimate for the development of railway artillery matériel?

Maj. JENKS. No, sir.

Mr. SLEMP. Except the continuation of the manufacture of the 14-inch railway mount?

Maj. JENKS. That is all, sir.

Mr. SLEMP. You feel satisfied with the type of railway mount?

Maj. JENKS. No, sir.

Mr. SLEMP. For all other calibers under the 14-inch?

Maj. JENKS. The program submitted calls for an 8-inch railway mount. We have a 35-caliber 8-inch gun on a railway mount as the result of war manufacture. The requirements will necessitate a 50-caliber 8-inch gun. We are asking no funds for such development, but we are holding that off until some future time. The Westervelt Board program includes 12-inch howitzers on railway mounts, and the one which we designed and delivered after the armistice covers that pretty closely. That has actually been fired. It is under some repairs now. The Westervelt Board includes the 14-inch gun and the 16-inch howitzer. The 14-inch gun is covered in our estimate this year and parts of the 16-inch howitzer are under manufacture for application to the 14-inch mount.

Mr. SLEMP. We have not any railway carriages under manufacture except the 14-inch?

Maj. JENKS. The 14-inch and parts of the 16-inch howitzer for application to the 14-inch mount.

Mr. SLEMP. Did we not have some 10 and 12 inch?

Maj. JENKS. They were completed under war contracts.

Mr. SLEMP. Were they not working on them during the last year at Watertown?

Maj. JENKS. The 10 and 12 inch mounts were under war contracts.

Mr. SLEMP. Were they completed and delivered?

Maj. JENKS. Yes, sir.

Mr. SLEMP. They are not working on any railway carriages?

Maj. JENKS. Not outside of the 14-inch and parts of the 16-inch howitzer material.

Mr. SLEMP. Does your organization cooperate with the Navy with regard to the guns of all the manufactured types, etc.—I suppose that would come in more on the seacoast?

Maj. JENKS. We are in close cooperation with the Navy design office and also the navy yard. In case anything comes up especially we are invited to have representatives present.

Mr. SLEMP. Do you think of anything else under this item which you want to mention?

Gen. PEIRCE. No, sir.

NUMBER OF TRACTORS IN SERVICE.

Mr. SLEMP. I should like to ask you a few questions, General. Of the 7,000 tractors which you mentioned you have in the Army, how many are now in actual use?

Maj. HARMON. There are in service of the 5-ton, 1,992, and of the 10-ton, 579. That statement does not mean that those are issued to the troops as a part of their war equipment, but they are actually out of storage and in use for some purpose.

Mr. SLEMP. How many 2½-ton tractors are there in service?

Maj. HARMON. About 12 in use at the Infantry School, about 56 at the Field Artillery School at Fort Sill, and one at Fort Snellin, the balance scattered among other stations except 19 in storage at Rock Island Arsenal; a total of 117.

Mr. SLEMP. That would leave you, then, about 3,000 to 4,000 other tractors?

Maj. HARMON. Yes, sir; about 4,000.

Mr. SLEMP. Where are they?

Maj. HARMON. They are in storage at the Savannah proving ground—5 and 10 ton, and 19 of the 2½-ton.

Maj. MOODY. The present record shows 117 2½-ton tractors, 3,791 of the 5-ton tractors, and 2,554 of the 10-ton tractors as now being on hand.

Mr. SLEMP. Are the remaining ones not in service, surplus or reserve?

Maj. HARMON. They are in reserve, none surplus.

Mr. SLEMP. Of the nearly 2,500 that you have in the service, how many are for the use of troops, how many for facilities around camps, posts, etc.

Maj. HARMON. I can just give you an estimate of that, sir. There are 1,260 with troops and the balance for other purposes.

Mr. SLEMP. To what extent have you motorized the regiments?

Maj. HARMON. Eighteen regiments have been motorized, 12 being manned by the Field Artillery and 6 by Coast Artillery troops.

Mr. SLEMP. You have done that largely this present fiscal year?

Maj. MURRAY. Yes, sir. Three of the Field Artillery regiments were motorized at the recommendation of the Westervelt Board. Maj. Moody can give you the exact date, it was early in the fiscal year, and the other two a little more recently.

Mr. SLEMP. You have enough of the 5-ton tractors with which to motorize some more, if you desire?

Maj. MURRAY. Yes, sir.

Maj. MOODY. The approved policy of the War Department is that where the 2.5-tons are not on hand necessary to motorize the five regiments, to use the 5-ton.

Mr. SLEMP. How many more regiments could you motorize if you desired to do so?

Maj. MOODY. I do not know exactly, but we have more than enough on hand to motorize the entire peace Army, I think, without question. If necessary the 10-ton could be used with the 155-millimeter howitzers, releasing the 5-ton for the 75-millimeter.

Mr. SLEMP. If that was done, would you have much of a reserve?

Maj. MOODY. Based on an estimate for an Army differing in form only slightly from the form of the last reorganization bill for an Army of about 1,500,000 men, including auxiliary troops, the total estimated number of tractors, including reasonable war reserve for replacement; based on war conditions, about 4 per cent per month, is 14,500 2.5-ton, 16,500 5-ton, and 10,800 10-ton, which shows that the total number of 6,452 being retained by the War

Department is from a war standpoint not a particularly large number, although it is more than enough to equip any peace Army which we are likely to have.

Mr. SLEMP. The tractors become obsolescent if kept four or five years and, perhaps, could not be used at all, that is, their use would be so expensive that you would not want to use them?

Gen. PEIRCE. I think it would be better to use them than to have none at all.

Mr. SLEMP. I do not know.

Maj. MOODY. Wherever they can be used in place of horses there is unquestionably an advantage.

Mr. SLEMP. Keeping them stored in different places over the country, with their growing obsolescence, it would be better to sell them. There is a bill before the House to sell a lot of that material.

Gen. PEIRCE. As I said this morning, of course, as a general proposition to sell material that is not as good as that which we could get in the future would be a good policy, provided we can get the war material in the future, but as between being without the material and keeping that which is not as good as we should like to have, the safer plan would still appear to be to keep what we have.

Mr. SLEMP. Col. Jenks, what part of the armament of fortifications B money expended will go to the Government arsenals?

Maj. JENKS. Probably, roughly, 80 per cent, and maybe more.

Mr. SLEMP. None of the tractor estimate will go there?

Maj. JENKS. Some of it has gone there during the last year.

Mr. SLEMP. Very little?

Maj. JENKS. Quite a bit.

Maj. MOODY. Quite a part of the stuff is not made commercially. A good deal is noncommercial work, and is being done at Government plants, and where it is commercial it is being bought outside.

Mr. SLEMP. Do I understand that to be a correct statement, that of the money asked for under Armament of Fortifications B, 90 per cent will go to the Government arsenals?

Maj. JENKS. 80 to 90 per cent.

Mr. SLEMP. Including the money for tractors?

Maj. MOODY. I think that is about correct, sir.

NUMBER OF EMPLOYEES AT ARSENALS.

Mr. SLEMP. General, will you please put a little statement in the hearings as to the number of men expected to be employed at the arsenals after July 1?

Gen. PEIRCE. I shall be glad to do so,

Mr. SLEMP. You have it here as of December 1, 1920?

Gen. PEIRCE. I think that the number will probably be somewhat less than that.

Mr. SLEMP. Some gentleman of the War Department gave it to me, but I lost the memorandum.

The number of employees at the arsenals will necessarily depend upon the appropriations as finally determined, the work which may be received from other departments, the prevailing scale of wages in comparative industry and other conditions which can not be actually forecasted. The present estimate of this number is as follows:

Chicago storage depot.....	22
Erie howitzer plant.....	8
Frankford Arsenal.....	1, 155
Picatinny Arsenal.....	540
Rochester gun plant.....	8
Rock Island Arsenal.....	1, 500
Springfield Armory.....	420
Watertown Arsenal.....	1, 200
Watervliet Arsenal.....	500
Total.....	5, 353

**PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION FOR MOUNTAIN,
FIELD, AND SIEGE CANNON.**

The next item is "Armament of Fortifications C." "For purchase, manufacture, maintenance, and test of ammunition for mountain, field, and siege guns, including the necessary experiments in connection therewith." You received \$1,600,000 last year and this year you are asking for \$5,950,000?

Gen. PEIRCE. Of which only \$2,027,500 is under A.

Mr. SLEMP. Please give the balance of the \$1,600,000 appropriated for this year?

Gen. PEIRCE. The unreserved free balance is \$230,215.75.

Mr. SLEMP. By that you mean?

Gen. PEIRCE. The free balance, unobligated.

Mr. SLEMP. That is, you will run through the year with expending less than \$1,400,000, instead of \$1,600,000?

Gen. PEIRCE. That is not the actual expenditure. Those are the obligations, the allotments.

Mr. SLEMP. You expect to expend all of this money?

Gen. PEIRCE. No, sir; about \$200,000 under maintenance of ammunition which comes in one of the items under C, will reach over until next year.

Mr. SLEMP. You are going to obligate to expend all of the \$1,600,000 that was given you last year for expenditure during the fiscal year?

Gen. PEIRCE. It may not be actually disbursed during the fiscal year, but it will be obligated for disbursement.

Mr. SLEMP. You will use it then?

Gen. PEIRCE. Yes, sir.

CURRENT EXPENDITURES.

Mr. SLEMP. Please give us a brief statement, General, in regard to this item.

Gen. PEIRCE. This is classified the same as the classifications under armament of fortifications B, first, into experimental and development work, which is subclassified into continuation of old work and new work. Under the continuation of old work the first item is for the development of a mechanical time fuze.

Maj. DAVIS. Of the total of \$1,600,000 for this year, \$1,000,000 was turned over to the field service for the maintenance of the reserve stocks of ammunition; that is, putting that ammunition into condition to keep permanently stored. Then, to the technical staff for tests at proving ground, \$5,000; allotment roll for draftsmen, \$16,300; travel

and transportation, \$36,000. Experimental allotments—development of powder, \$65,000; development of high explosive raw material—chemicals, \$55,000; development of mobile artillery fuzes, \$110,000; development of cartridge storage cases, \$2,000; development of cannon steel and chemical shell, \$80,000; development of semisteel shell, \$27,500; development of the best ballastic form of projectile, \$10,000; development of gas boosters, \$37,000; trench warfare loading problems, \$3,000; development work on loading high explosive shell and boosters, \$25,000; development of propelling charges, \$8,280; for the checking and storing of gages, \$55,000; foreign investigations, \$3,600; and for miscellaneous small items, \$8,000.

The total amount of the experiments was \$489,380. There are three other items for loading standard projectiles, development work on ballastic form of projectiles, and additional allotments which have been made for development of fuzes, totaling \$53,420.

Mr. SLEMP. Did you have any money, outside of the \$1,600,000 carried in the fortification bill of last year, that you expended on items under fortifications B?

Maj. DAVIS. We had some war money.

Mr. SLEMP. How much of that did you spend?

Maj. DAVIS. I do not have it as a total.

Mr. SLEMP. Approximately how much was it, and generally what was it for?

Maj. DAVIS. It was for development work and the maintenance of ammunition.

Mr. SLEMP. Those two items?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. None was for the production of new ammunition?

Maj. DAVIS. No, sir.

Mr. SLEMP. Did you make any new ammunition at all this fiscal year, except experimental types?

Maj. DAVIS. Nothing except experimental types; no, sir.

Mr. SLEMP. Your estimate last year called for some manufacture of ammunition, but you did not get the amount you asked for, and, therefore, you did not manufacture any?

Maj. DAVIS. That is right, sir.

Mr. SLEMP. You said \$1,000,000 was turned over to the Field Service. What do you mean by that, and how was that expended?

Maj. DAVIS. The Field Service is the service which has charge of the maintenance of ammunition, keeping it in proper condition.

Mr. SLEMP. In what way did you distribute that \$1,000,000?

Maj. DAVIS. It was distributed among the various field service depots.

Mr. SLEMP. How many are there of those?

Maj. DAVIS. Twenty-three, I think.

Mr. SLEMP. Did you divide it equally?

Maj. DAVIS. No, sir; because the ammunition was not stored at all 23 depots.

Mr. SLEMP. Do you know how many men were employed and just how the expenditure was made?

Maj. DAVIS. I have not those details.

Maj. HARMON. It was expended at practically all the ammunition arsenals and storage depots.

Mr. SLEMP. Have you had any reports from the people at these different posts as to the expenditure of this money—how it was expended?

Maj. HARMON. In a general sense; but I am not familiar with the details as ammunition is handled by a different division under Maj. Stuart—

Mr. SLEMP (interposing). Take the ammunition that you have stored, is there any special maintenance cost attached to that?

Gen. PEIRCE. Not particularly after it is stored, but the ammunition was not only received from contractors at the end of the war, but it was shipped back from France.

Mr. SLEMP. We appropriated for that last year, and that work was to be completed last year, according to the statements made to the committee.

Gen. PEIRCE. I think it was not so completed.

Mr. SLEMP. Of course, you understand this relates to ammunition?

Maj. HARMON. I have not the details as to that, because Maj. Stuart attends to that item.

Mr. SLEMP. Have you any reports from these ammunition depots as to the expenditure of that money?

Maj. HARMON. I have no doubt there are reports, but I have not that information.

Gen. PEIRCE. We have not the information as to the different places, but we have it under the different kinds of work.

Maj. DAVIS. There was a round-up made on July 1, 1920, of the total amount of ammunition to be overhauled; the field was surveyed as to what had to be done to each item and the total amount was arrived at; that total amount was \$8,462,682.

Mr. SLEMP. You expected to expend \$8,000,000?

Maj. DAVIS. After July 1, 1920.

Mr. SLEMP. On the existing stocks of ammunition?

Maj. DAVIS. Yes, sir. Of that \$8,462,000, \$6,462,000 was authorized to be used from war funds for the overhauling. Last year, that is, 1921, we got from A. of F., C., \$1,000,000. This year we are asking for \$1,000,000 more, which brings the total up to \$8,462,682. That is the total for the work that was to be done after July 1, 1920, and it is estimated that at the end of this fiscal year, that is, June 30, 1921, approximately three-quarters of that work will have been completed.

Mr. SLEMP. That was not the theory on which the \$1,000,000 was given to you for this fiscal year. The \$1,000,000 that you used of the \$1,600,000 appropriated for 1921, was combined with other money, war funds, and used for the purpose of putting the existing stocks of field ammunition in good shape.

Gen. PEIRCE. Yes, sir.

Mr. SLEMP. For maintenance alone how much money did you use last year?

Maj. DAVIS. It is very hard to divide it, because the maintenance in this particular case is absolutely wrapped up with putting it in condition. We had stocks of ammunition—

Gen. PEIRCE (interposing). The shell might be rusty and require cleaning and painting before it could be put into permanent storage. That is one illustration.

- Mr. SLEMP. I was trying to separate that which was in permanent storage and had to be maintained and that which had to be repaired and fixed up before you put it in storage, because after you get it in storage you do not do anything with it, do you?

Gen. PEIRCE. The loaded shell has to be watched, as well as the powder, to make sure that there is no deterioration which would make the ammunition dangerous. That is the surveillance. When one lot displays signs of deterioration which might make it dangerous it is necessary to take that whole lot and have it segregated, and probably retired from use.

Mr. SLEMP. Have you had to do any of that this fiscal year?

Gen. PEIRCE. Oh, yes, sir.

Mr. SLEMP. To what extent?

Maj. DAVIS. You mean in numbers of rounds of ammunition?

Mr. SLEMP. Yes; and how much money was spent on that character of work?

Gen. PEIRCE. \$50,000 for surveillance alone.

Mr. SLEMP. Now we begin to get some idea. You say \$50,000 for surveillance, and you have \$950,000 more.

Maj. DAVIS. That is all for either what you call maintenance or putting in condition for permanent storage. If you say that maintenance means the ammunition that is in storage and is simply being repaired, after having been in storage, then there was none of that spent in straight maintenance, because it is a question of first getting it into storage.

Gen. PEIRCE. Almost all of these items were for cleaning, painting, and repacking.

Mr. SLEMP. Have you ample supplies of ammunition for all calibers and grades of guns?

Gen. PEIRCE. Not for all. There are one or two calibers for which we have not an ample supply but a shortage. But for most of the calibers we have an ample supply.

Mr. SLEMP. Is there such a thing as an ample supply for the life of a gun?

Gen. PEIRCE. Well, an ample supply in the case of large guns would be for the accuracy life of the gun.

Mr. SLEMP. Have you an accuracy life supply for the 75's?

Gen. PEIRCE. Much more than enough but their supply is not figured on that basis.

Mr. SLEMP. What about the 155-millimeter guns?

Gen. PEIRCE. I think we have not much of a surplus there, in fact, I do not believe we have any.

Mr. SLEMP. Have you a supply equal to the accuracy life of the 155-millimeter guns?

Gen. PEIRCE. No, sir.

Mr. SLEMP. How much do you lack?

Maj. DAVIS. About 90 per cent considering all 155-millimeter guns and howitzers on hand.

Mr. SLEMP. How about your other types of guns?

Gen. PEIRCE. Well, for the 240-millimeter howitzers we have a very small supply; we only have about 100,000 shells all told for some 400 of those guns.

Mr. SLEMP. What is their accuracy life in rounds?

Gen. PEIRCE. I should say 5,000 rounds.

Mr. SLEMP. For what guns are you deficient?

Gen. PEIRCE. We are deficient in the 240-millimeter howitzers, the 155-millimeter guns and howitzers, and the 4.7-inch guns, but we have not many of the latter guns.

Mr. SLEMP. You are not asking any money with which to make ammunition next year and have spent no money this year?

Gen. PEIRCE. Except that we are asking for a little money for some 16-inch projectiles and some 12-inch projectiles.

Mr. SLEMP. That will come under another item?

Gen. PEIRCE. Yes; under another part of the bill.

Mr. SLEMP. Now take up the other items.

Gen. PEIRCE. The first item is for the development of a mechanical time fuse, under "A," \$50,000; for a constant pressure time fuse for aircraft and other high-angle firing, under "A," \$20,000; for continuation of development work on point detonating fuses, under "A," \$50,000; for continuation of the experimental work directed to the improvement of ballistic qualities of projectiles and the development of laws of rational projectile design, under "A," \$20,000; for continuation of development work to provide satisfactory booster for gas shells, under "A," \$40,000; for development of mobile artillery projectiles, under "A," \$250,000. This includes loading and assembling costs and experimental work on semisteel and chemical shell; for continuation of the development work on 155-millimeter trench mortar projectiles, including the manufacture of a small quantity for test and experimental purposes, none.

That is all put under "B." For experimental work on the development of new methods of loading of various types of projectiles, fuses, and boosters to increase the rate of production and decrease the cost under "A," \$10,000; for development and testing of ammunition packing boxes by the Forest Products Laboratory, Madison, Wis., to improve the present methods of packing ammunition, none, that has been put under "B;" for development and research work in interior ballistics, under "A," \$10,000; for experimental work in connection with propellant powders and ignition powders in accordance with the requirements of the caliber board report, under "A," \$25,000; for development and experimental work in connection with high explosives and component raw materials, under "A," \$40,000; for metallurgical research, under "A," \$5,000; for development and research work in exterior ballistics, including construction of range tables, under "A," \$20,000.

Mr. SLEMP. What is the total under "A?"

Gen. PEIRCE. I have not the total of that subdivision.

NEW WORK.

Mr. SLEMP. Now your new work.

Gen. PEIRCE. New work, for development of an aerial rocket, none, that is all under "B;" reworking of smokeless powder, none, that has been put under "B." Manufacture for issue, new work, for manufacture of chemical ammunition components to provide for deficits in ammunition war reserve on the basis of a five-year program, the total estimated cost of which is \$9,000,000, \$487,500. Repair and maintenance; for maintenance and surveillance of mobile

artillery ammunition in storage to prevent undue deterioration and to correct any dangerous conditions that may arise in connection therewith, under "A," \$1,000,000. The total for armament of fortifications, C, A items, \$2,027,500; B, \$3,722.500, and C, \$200,000.

FUSES.

Mr. SLEMP. You spent a good deal of money this year on the various types of fuses. Did you have any successful results from the expenditure of that money?

Maj. DAVIS. Yes, sir; we have had. The Waltham Watch Co., the Chelsea Clock Co., and the Ingersoll Watch Co. have all turned out experimental time fuses. They are built on the watch principle and not on the powder train principle. All of those fuses have passed a preliminary test and have shown up better than our present mechanical time fuses and better than our powder-train fuses.

Mr. SLEMP. Do you offer prizes for successful fuses?

Maj. DAVIS. No, sir; we do not give them prizes. The Waltham fuse has thus far proven the most satisfactory of the three.

Mr. SLEMP. Is this money for making some of those satisfactory fuses? Apparently not.

Maj. DAVIS. Do you mean next year's money?

Mr. SLEMP. Yes.

Maj. DAVIS. Yes, sir; for manufacturing only in experimental quantities for the development of mechanical time fuses.

Mr. SLEMP. How much will one of these cost?

Maj. DAVIS. About \$50.

Mr. SLEMP. How many will you buy?

Maj. DAVIS. One thousand of them. In production the fuses will cost only about \$8 or \$9.

Mr. SLEMP. Is it necessary to get that many of that expensive kind?

Maj. DAVIS. Yes, sir. In the matter of fuses you must supply a sufficient number so as to establish the average of failures.

Mr. SLEMP. That takes about 1,000?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. Is that same thing true in regard to these other types of fuses?

Maj. DAVIS. In the constant-pressure time fuses, the effect of the atmospheric pressure on the burning time is eliminated by making the fuse airtight.

Mr. SLEMP. The fuses we had during the war were not satisfactory?

Maj. DAVIS. No, sir; they were not entirely satisfactory. The powder-train fuse, or the old stand-by time fuse, was not at all satisfactory for antiaircraft work.

Mr. SLEMP. These are results of war discoveries?

Maj. DAVIS. Yes, sir.

DEVELOPMENT OF MOBILE ARTILLERY PROJECTILES.

Mr. SLEMP. One of the large items is \$250,000 for the development of mobile artillery projectiles. How many projectiles are you expecting to purchase?

Maj. DAVIS. There will be a number of projectiles that were developed this year for preliminary tests——

Mr. SLEMP (interposing). How much did you expend for them this year?

Maj. DAVIS. \$327,000.

Mr. SLEMP. How many shells did that give you?

Maj. DAVIS. I have the list here. There are 400 75-millimeter gas shell; 4,400 75-millimeter high-explosive shell; 3,500 105-millimeter shell; 1,800 1.8-inch and 2.24-inch shell, and new cartridge cases to go with them. Those shell being manufactured are all for Westervelt board guns, or the new type of guns.

Mr. SLEMP. They are for the new type of guns?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. It is not ammunition that could be used in the guns you have in storage?

Maj. DAVIS. No, sir; This is to keep pace with gun manufacture.

Mr. SLEMP. Is this not in advance of gun development?

Maj. DAVIS. No, sir; because some of the guns are nearing completion now and will be ready for test very shortly.

Mr. SLEMP. Take one of those guns, and state how many rounds you would fire from one of those pilots.

Maj. DAVIS. So far as ammunition is concerned, we expect to expend between 4,000 and 5,000 rounds.

Mr. SLEMP. On one gun?

Maj. DAVIS. Yes, sir; on one gun. That is not for every gun, but that is the total number of rounds to develop a satisfactory type of ammunition for that gun.

Mr. SLEMP. Will this year's estimate be sufficient to test out all of these experimental types that you expect to have built?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. The \$300,000 that you are spending this year and the \$250,000 that you want to have next year will represent a total expenditure of nearly \$600,000.

Maj. DAVIS. Yes, sir.

Mr. SLEMP. How many guns does that contemplate?

Maj. DAVIS. Eleven different guns.

Mr. SLEMP. They will be 11 different kinds of guns?

Maj. DAVIS. Yes, sir; 11 different kinds of guns.

Mr. SLEMP. Do you not feel that we are having a rather large expenditure? In 1912 we spent only \$300,000, and in 1913 we spent \$600,000. Now, having this enormous supply on hand you are spending \$400,000, \$500,000, or \$600,000 on experimental business entirely under this item, as against what you spent in 1912.

Gen. PEIRCE. That is developing methods of producing ammunition with a markedly longer range.

Mr. SLEMP. You have not the guns for them, however, in any quantities?

Gen. PEIRCE. The projectiles in most cases can be used in the present guns.

Mr. SLEMP. Is that your idea?

Maj. DAVIS. Not all of them, but some of them can be.

Gen. PEIRCE. They are developing projectiles for several types of guns.

Mr. SLEMP. You did not state that.

Maj. DAVIS. You asked me what projectiles we would manufacture next year.

Mr. SLEMP. Out of the \$250,000 that is estimated for.

Gen. PEIRCE. What I was referring to was your statement that we seemed to be spending a great deal of money for development work on projectiles, and I was trying to show the great value that was coming from that in the way of getting these increased ranges.

Mr. SLEMP. I understand that, but I did not get the point that these projectiles you are working on had any relation to the guns in use, but I understood they were for those new types.

Gen. PEIRCE. In some cases they do pertain entirely to new guns, but some projectiles and some development work we are doing will apply to guns we already have.

Mr. SLEMP. Of the \$250,000 you wish to have expended for development of mobile artillery ammunition this coming fiscal year, how much is for ammunition to be used in existing types of guns and how much is to be used in new types?

Maj. DAVIS. Approximately \$175,000 of it is for new guns.

Mr. SLEMP. That makes \$75,000 for improving old types?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. You left out these other items for boxes?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. And you have reduced the item for methods of loading?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. For experimental work in connection with propellant powder and ignition powder——

Gen. PEIRCE (interposing). That is \$25,000.

Mr. SLEMP. Where will this work be done, or the experimental and development work for ammunition?

Maj. DAVIS. At Picatinny Arsenal almost entirely. The actual tests or firing tests will be conducted at Aberdeen Proving Ground. The development work or the manufacture of the powder itself and the assembling of the ammunition will be done at Picatinny Arsenal.

Mr. SLEMP. Referring to the manufacture of ammunition, where is that done?

Maj. DAVIS. The metal components are manufactured partly at Picatinny and partly at Frankford Arsenal.

Mr. SLEMP. Practically all of this "C" work, outside of the \$1,000,000 for maintenance and surveillance, is arsenal work?

Maj. DAVIS. Practically all of it. There is a little that goes outside for contracts with universities that we have placed during this year and that we hope to place next year for research work.

Gen. PEIRCE. And some fuze work.

Mr. SLEMP. You left out the item for reworking and manufacturing smokeless powder?

Gen. PEIRCE. We have that under another item. You have a statement of all the facts about smokeless powder.

MANUFACTURE OF CHEMICAL AMMUNITION COMPONENTS.

Mr. SLEMP. The next is for the manufacture of chemical ammunition components.

Gen. PEIRCE. That item is \$487,500.

Mr. SLEMP. What do you mean by chemical ammunition components?

Gen. PEIRCE. There are to be manufactured a certain number of metal components of shells to be loaded with gas in order to make use of part of the shell that we have on hand that can not be loaded without these additional components——

Mr. SLEMP (interposing). Have you any amount of those shells on hand that have been loaded?

Gen. PEIRCE. Not any that have been loaded with gas, but these are some that we want to have in such condition that they can be loaded.

Mr. SLEMP. Have you any supply of them on hand now, or what is the necessity for getting any now?

Maj. DAVIS. We have for the 75-millimeter caliber 1,400,000 gas projectiles, but we have not for those 1,400,000 gas projectiles the necessary boosters to complete them as filled projectiles.

Mr. SLEMP. Have you no boosters?

Maj. DAVIS. No, sir.

Mr. SLEMP. None at all?

Maj. DAVIS. No, sir.

Mr. SLEMP. What does the booster cost?

Maj. DAVIS. A booster for the 75-millimeter piece costs approximately \$2.50 per round.

Mr. SLEMP. How many rounds do you want?

Maj. DAVIS. One million four hundred thousand is the complete program, but the deficits were drawn up with the total to be supplied amounting to 9,000,000. That was put in a five-year program, so that it will be about one-fifth of that particular deficit.

Gen. PEIRCE. This is only about one-fourth of that one-fifth.

Mr. SLEMP. How does it happen that your projectiles got into that state of completion, where you lacked boosters entirely?

Gen. PEIRCE. The shell manufacture itself was a well-established manufacturing process. The gas shell, except for the closure or nose, is practically the same as the high explosive shell. The booster, however, is the bursting charge, which opens up the shell to spread the gas, and that is an entirely new development. That was not completed. In other words, we did not get entirely satisfactory gas boosters during the war.

Mr. SLEMP. Could we not fire shells then? How did we manage to fire them?

Maj. DAVIS. We did not fire any of our own.

Mr. SLEMP. Have we no boosters at all on hand?

Maj. DAVIS. We have some boosters which the Chemical Warfare Service refuses to accept as satisfactory.

Mr. SLEMP. How many have you of those?

Maj. DAVIS. We have of the 75-millimeter caliber about 1,400,000.

Mr. SLEMP. What is the trouble with them?

Maj. DAVIS. They have too small capacity to properly vaporize the gas. In other words, they split the shell open, but do not properly vaporize the gas.

Mr. SLEMP. Why did the Government manufacture them?

Maj. DAVIS. I can not answer that, except that they were the best that were developed at that time.

Mr. SLEMP. Are they utterly useless?

Maj. DAVIS. No, sir.

Mr. SLEMP. It seems to me that anything that would break the shell would be worth something.

Maj. DAVIS. The difficulty is that there are different types of gases. The so-called persistent gases that stay any length of time after the shell bursts is in liquid form and has to be vaporized. If not, it will simply settle as a little pool on the ground. You not only want to break the shell, but you must subject the gas to sufficient heat to vaporize it and change it from liquid form into a vapor.

Mr. SLEMP. Where are the boosters that the Government has on hand tested?

Maj. DAVIS. At the Lakehurst Proving Ground.

Mr. SLEMP. Did we accept as satisfactory those that we purchased? Were they regarded as satisfactory?

Maj. DAVIS. No, sir; we got authority to go ahead and manufacture, but the statement was always made that they were not satisfactory.

Gen. PEIRCE. It was stated that they were not as efficient for our purpose as was desired.

Mr. SLEMP. Are you sure that you have the ultimate type of booster that you want?

Maj. DAVIS. No, sir.

Mr. SLEMP. Then, if you have \$1,500,000 to use, you might go and make another mistake.

Maj. DAVIS. We are asking for only one-twentieth of that \$1,500,000. That would be \$483,000 to be used in that way.

Gen. PEIRCE. That is not only for the 75-millimeter calibers, but it is for all other calibers of gas shell; 1,400,000 is the total number in the program for the 75-millimeter calibers. That was for five years, which would mean one-fifth annually. Then that was cut to one-fourth, which means one-twentieth of the whole.

Mr. SLEMP. Are the boosters for the various other shells in the same general condition that the boosters for the 75-millimeter calibers are in? That would show that you have quite a quantity on hand that you could use, but you do not want to use them. Why is it that you have some types for which you have no boosters at all?

Gen. PEIRCE. For the 155-millimeter gas shells we have 78,000 of a type that has been pronounced unsatisfactory by the Chemical Warfare Service. Of the 4.7-inch caliber we have none, and of the 8-inch gas shell we have none.

Mr. SLEMP. Does not the Aberdeen Proving Ground get any of these?

Col. RUGGLES. No, sir; the Chemical Warfare Service does that. In reference to the boosters, I will say that the development of gas was constantly changing during the war, and we think we have better gas than anyone else has. Some gases require the shell to be opened very violently and some require it to be done quietly. It is quite a different booster from that used in the high-explosive shell. We use a booster there to boost up the explosion from the detonator and give it a larger force to set off the rest of the explosive in the shell. The booster there is only an intermediate step in exploding the shell. In the case of the gas-shell booster, it splits open the shell, there being no other explosive in the shell, and we have to open the gas shell with different degrees of violence according to the kind of gas used.

The necessity for doing that gradually came up toward the end of the war, and the degree of violence, as I have said, varies with the different kind of gases used. The Chemical Warfare Service itself did not know exactly what was wanted. The thing is only in the development stage. It was the same thing during the war. You have got to adapt the booster to the particular gas employed. All those things were changing very rapidly toward the end of the war.

Mr. SLEMP. You should put in the record an itemization of the \$483,000.

Maj. DAVIS. Yes, sir.

In class A have been placed items to provide components for a small number of rounds of the various calibers:

Manufacture and load 100,000 boosters for 75 mm. gas shell, at \$2.50 each..	\$250,000
Manufacture and load 25,000 boosters for 155 mm. gas shell, at \$5 each.....	125,000
Manufacture and load 10,000 boosters for 4.7-inch gas shell, at \$4.50 each...	45,000
Manufacture and load 5,000 boosters for 8-inch gas shell, at \$7.50 each.....	37,500
Propelling charges for 4-inch stokes and fuzes.....	30,000
Total.....	487,500

MAINTENANCE AND SURVEILLANCE OF MOBILE ARTILLERY AMMUNITION IN STORAGE.

Mr. SLEMP. The next item is \$1,000,000 for maintenance and surveillance of mobile artillery ammunition in storage. Give us an idea of the condition of this ammunition. How much of it have you on hand and what is its condition? If you did not have any ammunition at all on hand, we might say to you, "Take this ammunition here and fix it up." I would say that would be all right, but you have a great quantity of ammunition on hand already, and I do not know what I would say in regard to fixing this amount of ammunition.

Gen. PEIRCE. This is to fix up and to prepare ammunition for storage. This includes the reserves that we are directed to retain. Nothing is contemplated to be done on ammunition that is surplus above the reserve.

Mr. SLEMP. What is your reserve?

Maj. DAVIS. The 37-millimeter combination of all types is 3,760,000; 75-millimeter shell, 6,000,000; 75-millimeter shrapnel, 7,890,000; 3-inch antiaircraft, 181,000; 4.7-inch guns, 470,000; 155-millimeter, 1,600,000.

Mr. SLEMP. In what relation to the accuracy life of the guns do you have reserves? Is that for the entire accuracy life of the guns?

Maj. DAVIS. No, sir; the allowance of a field gun is the quantity of ammunition that the munitions board of the Ordnance Department provides and from which our reserves are derived. It is figured on the consumption of ammunition, which, again, is based upon the mobilization of troops, or the supply of troops to the firing line, and the rates of fire which were used during the past war.

Mr. SLEMP. For what size Army and for how many guns are you holding this reserve?

Maj. DAVIS. I can not give you that in detail.

Maj. HARRIS. It is figured on a Regular Army of 16 divisions and a National Guard of 16 divisions, to be mobilized in six months; that is, for 32 divisions in six months, with an increment each month thereafter of 3½ divisions. The guns required and the rate of fire are

prescribed by the General Staff. This determines the quantity of ammunition expenditure. The limit of time varies in each case. The amount of reserves should be that quantity of ammunition required up to the time when the production of ammunition is in step with the requirements.

Mr. SLEMP. You are keeping in reserve enough ammunition for an Army of from six to seven hundred thousand men to fight with for six months?

Maj. HARRIS. An army starting at four divisions and increasing to 32 divisions in six months and thereafter increased every month by three and one-half divisions.

Mr. SLEMP. It would be almost 1,000,000 men?

Col. RUGGLES. We must have a sufficient amount of reserve ammunition to tide us over the time after mobilization that will elapse until we can manufacture ammunition as fast as it is expended.

Mr. SLEMP. Suppose this \$1,000,000 is not given you next year, what effect would that have upon the amount of ammunition necessary to have for an army of that size to fight six months? It would not have much effect, would it?

Maj. DAVIS. Yes, sir; because if \$1,000,000 is spent this next year, it will catch a great deal of this ammunition and put it in a serviceable condition at a reasonable cost, whereas if it is not done this year, the condition will be very much worse, and it will cost more to put it into a proper condition. That is because the deterioration will have progressed further. We are not accumulating any more ammunition. This is ammunition that is already on hand and which is required by the mobilization of the Army, or it provides sufficient reserves of ammunition to let the production get started and to get in step with the consumption.

Maj. STUART. This figure of \$1,000,000 is simply the amount required to complete the work of putting our war reserve ammunition in condition?

Mr. SLEMP. That is a general statement. Suppose you translate that into detail covering the kind of shells to be put in condition, and the amount of work to be done, and the details as to the cost, etc.

I notice that on July 1, 1920, you had, giving the larger items, 3,225,000 of the 37-millimeter shell, 4,850,000 of the 75-millimeter shell, 6,000,000 of the 75-millimeter shell empty, 6,400,000 of the 75-millimeter shrapnel, 1,500,000 of the 155-millimeter shell, 1,775,000 of the 155-millimeter shell empty, 1,184,000 of the 155-millimeter howitzer propelling charges, and 2,700,000 of the 21-second time fuzes. This work remained to be overhauled on July 1, 1920?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. What progress was made on that work during the present fiscal year, and what remains to be done?

Maj. DAVIS. There remains to be overhauled after June 30, 1921 the following quantities: 37-millimeter shell, 375,000; 75-millimeter shell, 587,000; 75-millimeter shell, empty, 700,000; 75-millimeter shrapnel, 771,000; 155-millimeter shell, 183,000; 155-millimeter shell, empty, 206,000; 155-millimeter propelling charges, 34,000; 155-millimeter howitzer propelling charges, 137,000; and time fuzes, 317,000.

Mr. SLEMP. There are various other items given on the list, smaller amounts. Taking these various items you have many more millions-

of these 75-millimeter shells besides those you have overhauled during the fiscal year?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. So that the mere overhauling of the shells that you have estimated to be overhauled this coming fiscal year is not any special matter of national necessity in any way?

Maj. STUART. The point is just this, Mr. Chairman: This ammunition—I do not know whether this has been explained—was originally manufactured for expenditure within a very short time and the measures of protection, in order to speed up the manufacture, that were adopted were only sufficient to protect it for, say, six months during the time between loading and final firing at the front. Ammunition in that condition will deteriorate rapidly and we are taking the worst material first. All the time that we are now working on the material which we will finish this year the other ammunition is getting in worse shape and while it is difficult to say just how many rounds would deteriorate to the point of worthlessness if we let it go, we feel that the value of the material, compared with the slight cost of the work itself, is so great that it would not be a good business proposition to delay it.

EFFECTS OF ELIMINATING \$1,000,000 FOR MAINTENANCE OF AMMUNITION.

The total number of shell, separate loading propelling charges and fuzes in the Army reserve as approved, compared with the number which could not be overhauled if the \$1,000,000 is not allowed, is as follows:

	War reserve.	Number which could not be overhauled.
Shell.....	45,189,000	3,375,000
Propelling charges, 155 millimeters and above.....	2,520,000	241,000
Fuzes.....	2,700,000	317,000

The calibers most unfavorably affected would be:

Name.	War reserve.	Number which could not be overhauled.	Cost of overhauling.
155-millimeter projectiles.....	3,469,000	389,783	\$140,321.28
155-millimeter propelling charges.....	1,699,000	172,018	22,351.68
240-millimeter projectiles.....	115,000	12,806	8,259.84

In the case of the above calibers the war reserve is decidedly below requirements and if part is allowed to deteriorate this shortage will be still further increased.

The \$1,000,000, in addition to providing for overhauling, also allows \$50,000 for surveillance of powder and explosives. Smokeless powder, particularly, is subject to spontaneous decomposition in storage, causing ignition of the powder, which in turn would probably result in disastrous fires and explosions with large loss of life and property. This decomposition can be detected in time to prevent ignition by certain tests which were adopted many years ago by the Army and the Navy. These consist of continuous tests carried on at Picatinny Arsenal on each lot of powder (of which there are over 4,500) and require elaborate equipment and local tests made at the point of storage on lots at that point. Each test supplements the other and both

are necessary. The \$50,000 required for personnel and material needed for this work is itemized as follows:

Surveillance at Picatinny Arsenal:

1 chief chemist.....	\$3,000
1 chemist.....	2,000
1 laboratory assistant.....	1,200
3 surveillance magazine watchmen.....	3,120
1 clerk.....	1,200
Apparatus, equipment, supplies, and unforeseen.....	4,480

Total at Picatinny.....	15,000
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Surveillance at storage depots:

1 chief surveillance inspector.....	4,000
12 surveillance inspectors.....	26,400
Apparatus, equipment, and supplies.....	4,600

Total at storage depots.....	35,000
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Grand total.....	50,000
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While failure to overhaul the ammunition which can not be completed this fiscal year will result in diminishing the reserve by the amount which will deteriorate to the point of unserviceability, the failure to provide the \$50,000 for surveillance would necessitate the suspension of all tests and the discharge of the personnel who have had to be especially trained at considerable expense. The effect of such an action can be understood from the fact that during the past year deterioration has been detected by Picatinny Arsenal in the case of 45 lots, and by local surveillance inspectors in the case of 5 lots.

Mr. SLEMP. Your point is that by the expenditure of \$1,000,000 you will make usable about \$37,736,000 worth of ammunition?

Maj. STUART. Yes, sir; the value of the ammunition.

COST OF AMMUNITION—VALUE OF AMMUNITION ON HAND.

Mr. SLEMP. What is the total valuation of the ammunition you have now on hand?

Maj. STUART. The actual cost to the United States was \$2,242,000,000. That includes the cost of settling the claims. In other words, that is the total amount that we paid for the ammunition we got and for the increased facilities which the various manufacturers put in or which we put in for them, and the settlement of the claims up to——

Mr. SLEMP (interposing). How much have we now on hand?

Maj. STUART. The total ammunition on hand represents a value of approximately \$660,000,000, simply multiplying the number of rounds by the contract price; but you can see that that is a very misleading figure, because it actually cost us very much more than that, probably twice.

Mr. SLEMP. But it would be a basis of comparison between the \$37,000,000 of ammunition that you will get by overhauling the \$600,000,000 of ammunition which you say is the value?

Mr. STUART. Yes, sir.

Mr. SLEMP. Do you contend that the \$37,000,000 of ammunition would become absolutely worthless unless you spent \$1,000,000 on it this coming year?

Maj. STUART. It is hard to say just how far it would go. It is getting worse all the time. It is hard to foresee what condition it is going to be in a year hence; but we know, from the rate it has

been deteriorating in this unprotected condition, that is would be worth while.

Mr. SLEMP. What is the character of the deterioration—rusting?

Maj. STUART. Rusting; and if powder is not properly protected from the moisture, that hastens its deterioration. The fuses also are not in hermetically sealed containers and they lose accuracy very rapidly.

Mr. SLEMP. No money is to be used out of this appropriation for ordinary maintenance, irrespective of overhauling?

Maj. STUART. There will be practically none of that for this next year. There is \$50,000 allowed us for the surveillance of ammunition. If we can complete this work as we intended, considering the fact that we have just finished the other, the maintenance should be very small. I think that figure will take care of it.

Mr. SLEMP. Do you expect any deterioration in the remaining part of the \$600,000,000 of ammunition outside of the \$37,000,000 you have referred to?

Maj. STUART. No, sir; this will complete the job.

Mr. SLEMP. When it is completed, do you expect any deterioration after that?

Maj. STUART. Comparatively little, except powder. The material will be in such a condition that it should require a comparatively small maintenance charge to keep it in good shape from year to year, in addition to which powder and fuses and other powder-filled items must be periodically renewed.

Mr. SLEMP. You are not estimating in any way for quantity production of any types of ammunition at all for any of the guns in the field service. You think that is a wise policy not to give private contractors or the arsenals some little work to be done, or will that be taken up with the experimental work?

Gen. PEIRCE. I think all that is necessary will be covered by the experimental work. While it is desirable, as I said before, to keep alive this knowledge, we did not feel that, having these stocks of ammunition on hand, it would be necessary or proper to have any further actual production of ammunition in quantity.

Mr. SLEMP. Of course, experimental development work will be done exclusively in the arsenals, and that will leave the private manufacturers of shell with nothing to do. The Government facilities are not very large for the manufacture of shell; they are practically all private?

Gen. PEIRCE. Not very large. There are facilities for the manufacture of shell retained in Chicago, at the storage depot.

Mr. SLEMP. What shells do you make there?

Gen. PEIRCE. The 75 millimeter up to and including the 240 millimeter.

Mr. SLEMP. The larger calibers beyond that you do not make?

Gen. PEIRCE. Not there; no, sir. We have some capacity for the larger calibers at the Watertown Arsenal.

Mr. SLEMP. I understood that that was not very successful.

Gen. PEIRCE. You mean in the A. P. shop?

Mr. SLEMP. The larger shop for shell.

Gen. PEIRCE. They have not made as good shell as they have at the Midvale steel plant.

Mr. SLEMP. That is what I understood.

Gen. PEIRCE. There is one thing which I should like to say in connection with this ammunition. After it is conditioned and put into storage it is not exactly accurate to say that there is no deterioration or no practical deterioration thereafter. There will be deterioration of powder and fuses. We estimate that the life of smokeless powder is about 15 years and if not reworked within the 15-year period it will deteriorate to the extent where it would not be usable.

Mr. SLEMP. Stocks of powder of the kind usable for Field Artillery service—have we a sufficient quantity of that to get along without any trouble?

Gen. PEIRCE. We have except for some few calibers. We have a good deal of surplus of some calibers, and in a few calibers not enough for the reserve requirements.

Mr. SLEMP. What calibers are those?

Gen. PEIRCE. The 240-millimeter, and above.

Mr. SLEMP. There would not be any above?

Gen. PEIRCE. Not for the mobile; no, sir.

Mr. SLEMP. That would not amount to very much?

Gen. PEIRCE. No, sir.

The whole powder situation is a very important one, and is very clearly set forth in the memorandum which we gave you.

POWDER ON HAND.

Mr. SLEMP. Perhaps, General, you had better give us a little brief summary of the powder situation.

Gen. PEIRCE. We have somewhere around 275,000,000 pounds of smokeless powder on hand, and we have in addition to that some 8,000,000 pounds, I think, of pyrocotton, which is powder in about the halfway stage. This powder will not be serviceable, as far as our experience goes, and we can predict for a greater period than 15 years unless reworked within that period. The expense of reworking it is approximately about half of the expense of the new powder. The proposition therefore to get the greatest value out of the amount of powder on hand would involve its being reworked, or that part which can be reworked, within a period of 15 years.

Mr. SLEMP. The powder lasts 15 years?

Gen. PEIRCE. That is a general statement. It is approximately 15 years before it deteriorates enough to become unsatisfactory. The maximum that we could get out of the powder, of course, would be to delay reworking it for 14 years and then rework it all in the fifteenth year. That would involve a great deal of money in that one year. The program, therefore, can be adopted for any number of different courses. It can all be left until the fourteenth year and then reworked or reworked half of it in two years short of that and the other half in the last year, or at the other end, rework one-fifteenth of the total amount each year. Under the A estimate we propose to rework only sufficient of that powder the coming year to keep a skeleton force at the Picatinny Arsenal and to do a very small amount of it outside in order to keep the smokeless powder industry alive in the country outside of Picatinny. Otherwise we have information that it will be entirely abandoned. That is cannon powder that I am talking about. The two purposes served by the A estimate under powder that we have here are to keep the skeleton force employed at the Picatinny

Arsenal, which is our only powder factory, and to permit a little reworking outside, so as to avoid the entire disintegration of powder making.

Mr. SLEMP. Do you remember how much money you want as a total for your powder proposition in this bill?

Col. HARRIS. Four million pounds of powder.

Mr. SLEMP. That is the total powder estimate?

Col. HARRIS. Four million pounds of powder to be provided for.

Gen. PEIRCE. It costs somewhere about 30 cents a pound.

Mr. SLEMP. Do I understand also that you sell, or is there any attempt to sell, the surplus powder?

Gen. PEIRCE. We have been trying to sell some for a long time. I have not heard that they have succeeded yet. They sold some of the pyrocotton at approximately one-thirtieth of its cost.

Mr. SLEMP. Where was that done?

Gen. PEIRCE. I think the sale was made in New York.

PURCHASE, MANUFACTURE, AND TEST OF SEACOAST CANNON.

Mr. SLEMP. The next item is, "For purchase, manufacture, and test of seacoast cannon for coast defense, including their carriages, sights, implements, equipments, and the machinery necessary for their manufacture." You had \$2,000,000 last year, and I suppose that you had some other funds, did you?

Maj. JENKS. In the hearings of last year we said that we expected to allot during the fiscal year 1920, \$900,000 after the date of the hearings. The gross allotments made since that date are a little bit more than \$500,000. We have revoked all funds under DFG which pertain to the manufacture of 16-inch guns and howitzers and carriages for which Congress appropriated money last year. We have revoked \$596,000 on orders for 16-inch guns, 16-inch howitzers and carriages, war funds, and have turned those back to the Treasury. I will state that we revoked \$220,000 under B for 14-inch guns, war funds.

Mr. SLEMP. When was that done?

Maj. JENKS. Since the beginning of the present fiscal year. The manufacture of 14-inch guns and their mounts and 16-inch howitzers and their mounts are being carried on under the appropriation made for the current fiscal year.

Mr. SLEMP. The \$900,000 that you indicated you would allot after the hearings for 1920?

Maj. JENKS. The net allotment was about \$518,000, and with the additional amount to be revoked the net allotment will be less than \$500,000.

Mr. SLEMP. How do you account for the expenditure of \$2,500,000?

Maj. JENKS. Practically all of that \$500,000 was for the purchase of material which was bought last year. There is only a small amount of it which was obligated for expenditure in arsenals during this fiscal year.

CURRENT EXPENDITURES.

Mr. SLEMP. That brings you down practically to an explanation of what was done with the \$2,000,000?

Maj. JENKS. Yes, sir. Under the war funds we had finished one 16-inch disappearing carriage. That does not enter into the estimate for this year, there was not over \$100,000 actually expended during the year for that item. Of the funds for the current year on January 29 there has been allotted \$1,702,713, leaving \$297,287 unallotted. Of the allotments made, \$1,560,000 has been allotted for the 16-inch guns, howitzers, and their carriages, and \$110,000 will still be allotted for that work. It is expected to allot \$60,000 toward the construction of two proof mounts; \$11,000 has been allotted for fire control development work and it is expected to allot \$24,000 more; \$39,263 has been allotted for facilities and preservation of facilities, and we expect to allot \$9,000 more; \$5,000 has been allotted for experimental work on determining the relation of stress and strain in metals; \$54,000 has been allotted for design work, \$5,000 for travel, \$10,000 for transportation, \$5,150 has been allotted for miscellaneous work, \$22,587 will be allotted for that purpose, \$13,300 for miscellaneous research work, and \$71,700 is expected to be allotted, making a total of \$2,000,000 allotted and to be allotted.

Mr. SLEMP. In general terms, the experimental development work takes how much?

Maj. JENKS. Roughly, \$10,000 under this appropriation this year.

Mr. SLEMP. And the remaining part goes to the old production, that is, the continuation?

Maj. JENKS. Continuation of production of seacoast armament under the board of review projects.

Mr. SLEMP. The 16-inch howitzer and the 16-inch gun carriages were continued?

Maj. JENKS. Yes, sir.

Mr. SLEMP. Has there been any work done on the 10 and 12 inch or other carriages?

Maj. JENKS. No, sir. Under the funds which held over we have completed a 16-inch carriage which is now under shipment to the proving ground, a disappearing carriage. Those photographs [indicating] do not illustrate the carriage very well. It is so big that it is difficult to illustrate it. The 16-inch gun carriage which we are now erecting is the first 16-inch barbette carriage constructed at the Watertown Arsenal. We hope to have that carriage under shop test during the next month. I have some photographs which will illustrate the size of the carriage.

This photograph shows the base ring of the 16-inch barbette carriage on the boring mill; there are only four or five boring mills in the country which are capable of machining that part. I thought it might be of interest to bring this photograph showing the 12-inch railway mount on the turntable.

Mr. SLEMP. I did not understand that you were using any money for carriages under 12 inches.

Maj. JENKS. No, sir; that was something done last year.

Mr. SLEMP. This year or last year?

Maj. JENKS. I think that was completed early during the current fiscal year; the obligation was incurred during the past fiscal year. This shows the 12-inch railway howitzer, which is under test at the proving ground, it having been manufactured last year. Then we have also produced three sets of 16-inch gun forgings this year for

spare guns, that is, for proving ground use and also for spare use, as reported in the last year's hearings.

Mr. SLEMP. That has been paid for, has it?

Maj. JENKS. That will be paid for out of this year's funds.

Mr. SLEMP. It seems to me you have managed this pretty well.

Maj. JENKS. The first howitzer carriage will not be assembled until late this fiscal year. We hope to complete the first 16-inch howitzer carriage and have it assembled about June. We have had to slow down on that order because of the lack of funds.

Mr. SLEMP. Last year you stated that delivery of these 16-inch guns and their carriages, and the howitzers and their carriages, would be dependent upon the character of authorization that you had at these various arsenals. You stated that under the funds estimated for you would have one delivery in 1920 and five 16-inch guns and six of the carriages delivered in the fiscal year 1921.

Maj. JENKS. That was under the estimates submitted but not under the funds appropriated.

Mr. SLEMP. The other day I looked over the list of employees at the various arsenals during this fiscal year and I do not believe that at Watertown or at Watervliet, where these large guns are manufactured, there has been any diminution in the number of men during this entire fiscal year.

Maj. JENKS. The reason for that is that after the hearings last year, and after it was certain that the acts would provide for the obligation of funds at arsenals in the same manner as under contracts, that all work was slowed as much as practicable at the arsenals, and the funds which it had been anticipated would be used before June 30 were spread out for a longer period of time.

Mr. SLEMP. I do not think I found the cutting of the force in any way.

Maj. JENKS. The force is larger at the Watertown Arsenal than we estimated it would be possible to hold it under the appropriations.

Mr. SLEMP. How do you account for that?

Maj. JENKS. That is accounted for by the fact that there was a greater amount of work carried over than it was anticipated would be carried over.

Mr. SLEMP. Yet your deliveries are nothing like what they were stated they would be?

Maj. JENKS. That was not under these orders, sir; it was under other work. We have allotted \$1,560,000 for 16-inch gun and howitzer work, including guns, carriages, etc., and those are the only funds that have been used at the Watertown and Watervliet arsenals for carrying on that manufacture, and the forces on that work have been cut down very much.

Mr. SLEMP. All the work you propose doing at either one of those arsenals is work on 16-inch guns and howitzers?

Maj. JENKS. No, sir. At the Watertown Arsenal we have a projectile plant which is entirely outside of this.

Mr. SLEMP. But that is only for experimental and development work. You will have no production of ammunition next year.

Maj. JENKS. I can not answer that question, because—

Mr. SLEMP (interposing). Unless it would come in under H.

Maj. JENKS. I think it is under H. There is also a gun-forging plant at Watertown as well as a steel-casting plant, and at Water-

vliet we will also be engaged on small-gun work which comes under the experimental programs.

Mr. SLEMP. You also do some Navy work there, do you not?

Maj. JENKS. And Navy work also.

Mr. SLEMP. You have all of the forgings for the 16-inch guns and howitzers paid for, have you not?

Maj. JENKS. Not quite, sir; there is probably \$100,000 worth of forgings required for 16-inch guns, but we are not estimating for any more forgings next year.

Mr. SLEMP. To whom do we owe that?

Maj. JENKS. They are not ordered.

Mr. SLEMP. Is that in addition to your twelve 16-inch guns and twelve 16-inch howitzers?

Maj. JENKS. They are the forgings to complete that total number.

Mr. SLEMP. How many forgings have we of the 16-inch guns?

Maj. JENKS. We have included those completed and included those under appropriations for the insular possessions; 18 sets of forgings for 16-inch guns and 13 for 16-inch howitzers.

Mr. SLEMP. That would be two more than we have been contemplating?

Maj. JENKS. No, sir; our 16-inch guns call for a disappearing carriage, under appropriations made in 1917; 12 under A. of F., D. F. C., 2 for Hawaii, and 3 spares.

Mr. SLEMP. You have 18 of those forgings all paid for?

Maj. JENKS. We lack a few forgings of those sets; three sets are not complete.

Mr. SLEMP. In what degree of completion are those three sets?

Maj. JENKS. Oh, roughly, 75 or 80 per cent.

Mr. SLEMP. Where are they?

Maj. JENKS. They are under manufacture now; that is, those that are ordered are under manufacture at the Midvale Steel Co.'s works.

Mr. SLEMP. What about your howitzers?

Maj. JENKS. Of the howitzers, we have 12 under this appropriation and 1 that was made under B, under a war appropriation.

Mr. SLEMP. Are they completed?

Maj. JENKS. The forgings are completed, yes, sir. Our material for the carriages is not complete; we are short of all material for at least two carriages, and then we are short of other material for more than that.

Mr. SLEMP. What about the 14-inch guns—what about their forgings?

Maj. JENKS. Complete, sir.

Mr. SLEMP. And all paid for?

Maj. JENKS. Yes, sir.

Mr. SLEMP. Where are the forgings delivered?

Maj. JENKS. Of those covered by the estimate, at Watervliet Arsenal.

Mr. SLEMP. Give us your estimated deliveries of the 16-inch guns and howitzers, and the 14-inch guns with their carriages.

Maj. JENKS. This year we hope to complete, in addition to the 16-inch disappearing carriage and 16-inch gun—

Mr. SLEMP (interposing). You have been completing that one for several years.

Maj. JENKS. In addition to that we hope to complete three 16-inch guns, two 16-inch gun carriages, one 16-inch howitzer, and one 16-inch howitzer carriage during this fiscal year.

Mr. SLEMP. All at once or scattered along?

Maj. JENKS. Oh, no, sir; they are scattered. The 16-inch gun for the first 16-inch carriage will be completed and shipped in about 10 days and the first carriage will be completed next month, and then the remaining 16-inch gun carriages and the first 16-inch howitzer carriage will not be completed until nearly the end of the fiscal year. Those dates are dependent upon no unusual difficulties being encountered.

ESTIMATED COST OF GUNS.

Mr. SLEMP. How much does a 16-inch gun cost?

Maj. JENKS. It is estimated to cost \$300,000, that is, for the gun, and \$250,000 for the carriage.

Mr. SLEMP. That makes \$550,000?

Maj. JENKS. Yes, sir.

Mr. SLEMP. And the 14-inch gun?

Maj. JENKS. The estimated cost of the 14-inch gun is \$115,181, and the estimated cost of the railway mount is \$300,000.

Mr. SLEMP. How much money are you going to require to complete the twelve 16-inch guns—so frequently referred to—after this fiscal year?

Maj. JENKS. To complete the guns after July 1, 1921, \$1,237,624, and the carriages, \$1,171,075, a total of \$2,408,699.

Mr. SLEMP. You have been working on those guns since 1918?

Maj. JENKS. There has practically been no work done on those guns except since 1919; that is, in the spring of 1919.

Mr. SLEMP. Do you expect the cost to diminish in the near future?

Maj. JENKS. It is difficult to state that, sir. The labor cost; that is, per day, will undoubtedly diminish, but the unit cost on these guns and carriages may not diminish at all, due to the fact that the arsenals are operated on such a small capacity that the overhead is large in comparison with the direct labor cost.

Mr. SLEMP. According to your statement, after this year you will still owe \$2,400,000 for the 16-inch guns?

Maj. JENKS. Yes, sir.

Mr. SLEMP. They are about 66½ per cent completed?

Maj. JENKS. Yes; they will be June 30.

Mr. SLEMP. I did not get your figures as to the howitzers.

Maj. JENKS. The total amount allotted to the end of this year is \$2,188,000 for both howitzers and carriages, and the total cost is about \$4,200,000.

Mr. SLEMP. You are only about half way through?

Maj. JENKS. Yes, sir.

Mr. SLEMP. And this does not say anything about the spares or the two authorized for Hawaii?

Maj. JENKS. The two authorized for Hawaii are in another appropriation, under insular possessions.

Mr. SLEMP. What about the 14-inch guns that have been transferred, so far as next year is concerned?

Maj. JENKS. They have been transferred to this appropriation. These figures are for twenty-two 14-inch guns; some of them are

complete, but they have been carried along as an order of 22 guns; the total estimated cost is \$2,534,000.

Mr. SLEMP. That is exclusive of the carriages?

Maj. JENKS. Yes, sir. The amount to complete after July 21, 1921, is \$655,722.

Mr. SLEMP. You told us that last year.

Maj. JENKS. And since that time we have revoked \$220,000 of last year's funds, which is more than we have allotted for this year.

Mr. SLEMP. Did you not say you would complete those 14-inch guns for \$625,000?

Maj. JENKS. I do not think that was the figure; it was \$625,000 that we asked for last year, and there was an amount in addition to that.

14-INCH GUNS.

Mr. SLEMP. You speak very frequently in all these hearings about 22 14-inch guns. How many 14-inch guns have you?

Maj. JENKS. There is a total of 42 14-inch guns manufactured or under manufacture.

Mr. SLEMP. Why do you refer to 22 instead of 42?

Maj. JENKS. Because the order which is covered by the estimates was originally 22, and the other 20 were either guns turned over by the Navy Department or those made by the Bethlehem Steel Co., under a war contract.

Mr. SLEMP. Let us straighten that out. Have we 20 completed 14-inch guns outside of the 22 that you refer to?

Maj. JENKS. They are either completed or being completed under a war contract.

Mr. SLEMP. Will we be out any money in any way for those 20?

Maj. JENKS. Merely the cost of inspecting those which are now under contract.

Mr. SLEMP. How many of those are completed and now in the hands of the Government as completed guns?

Maj. JENKS. Of the 20, five are completed and 15 are in various stages of completion.

Mr. SLEMP. The five that are completed—are they the naval guns that were turned over?

Maj. JENKS. Yes, sir.

Mr. SLEMP. Where are they?

Maj. JENKS. Some of them, I think, all of them are at the Aberdeen proving ground.

Mr. SLEMP. Is that right, Colonel?

Col. RUGGLES. I do not know exactly, but I think there are a couple at Camp Eustis.

Mr. SLEMP. Have those five the naval carriage?

Maj. JENKS. We have six naval mount carriages.

Mr. SLEMP. Are these guns on those carriages?

Maj. JENKS. Whether they are at this moment I can not tell you, sir, without checking the records.

Col. RUGGLES. I think they are all mounted on their carriages.

Mr. SLEMP. Do the six represent the total number of naval mounts turned over by the Navy for 14-inch guns?

Maj. JENKS. My memory is six of the war design and one of the subsequent design.

Mr. SLEMP. And did the Navy turn over to us only six of the 14-inch guns?

Maj. JENKS. There were five guns, sir.

Mr. SLEMP. Fifteen of these guns, you say, are under manufacture by the Bethlehem Steel Co. and are in various stages a completion?

Maj. JENKS. Yes, sir.

Mr. SLEMP. When will they be completed?

Maj. JENKS. This fiscal year.

Mr. SLEMP. And the money has been reserved out of war funds to pay for these 15 guns?

Maj. JENKS. Yes, sir.

Mr. SLEMP. What possible advantage could result by continuing the manufacture of the 22 14-inch guns that you mentioned, already having 20?

Maj. JENKS. I would like to have that question answered by Gen. Coe, because the Ordnance Department is ordered by the War Department to build these guns. The Coast Artillery has a project for the use of them.

Mr. SLEMP. How much money are you spending on 14-inch guns, in excess of the 22 referred to last year as continuing the production of 22 14-inch guns?

Maj. JENKS. You mean, outside of the 22?

Mr. SLEMP. Yes.

Maj. JENKS. The inspection costs will probably run \$3,000 or \$4,000.

Mr. SLEMP. Will they not be completed until the end of this fiscal year?

Maj. JENKS. Oh, no; sir.

Mr. SLEMP. We must pay it out of the Treasury, whether it is paid through the appropriation of last year or through the war funds. How much money was expended?

Maj. JENKS. I can not answer that question without checking up the records.

Mr. SLEMP. Does the Bethlehem Co. finish these guns?

Maj. JENKS. Yes, sir.

Mr. SLEMP. They are to absolutely complete the guns?

Maj. JENKS. Yes, sir.

Mr. SLEMP. Heretofore they have mostly turned over the forgings to us?

Maj. JENKS. Ordinarily we purchase forgings only, but they have quite a gun plant.

Gen. PEIRCE. Thirty years ago they made 100 guns on a contract.

Maj. JENKS. And they are making naval guns.

Col. RUGGLES. They have a big and good gun plant there.

Mr. SLEMP. How much did you say would be required to complete the 14-inch guns?

Maj. JENKS. \$655,000.

Mr. SLEMP. At the expiration of this fiscal year?

Maj. JENKS. Yes, sir.

Mr. SLEMP. What deliveries do you expect of those?

Maj. JENKS. Five guns out of the 22 this fiscal year.

Mr. SLEMP. What about the deliveries for next year?

Maj. JENKS. The amount asked for under A items is \$150,000 for 14-inch guns. That would be based on completing about three guns. There is one thing in reference to the 14-inch guns: During the war

a \$50,000,000 project was initiated to manufacture 14-inch guns. for the reason we did not have the guns——

Mr. SLEMP (interposing). I thought that was the 16-inch gun.

Maj. JENKS. No, sir; it was the 14-inch gun. If the United States Government is going to have any 14-inch guns or any larger calibers during war, we must manufacture them during peace. There is no time during war to manufacture guns of large caliber.

Col. RUGGLES. They are required for railway mobile artillery.

Maj. JENKS. It is impossible to build large caliber guns during war time.

Mr. SLEMP. We are going through with the mobile Field Artillery 14-inch gun just what we have gone through with in respect to other guns. We know that the 14-inch gun is not comparable to the 16-inch gun, and yet we march straight on building them.

Maj. JENKS. Except for its mobility, and there it is superior to the 16-inch gun.

Mr. SLEMP. I suppose it is mobile, but you could not at a range of 20 miles penetrate 12-inch armor with a direct hit, and with an oblique hit the penetration would be less.

Col. RUGGLES. I think the 14-inch gun would penetrate any deck armor.

Mr. SLEMP. The 12-inch gun would penetrate deck armor.

Col. RUGGLES. The 14-inch gun has a range of 42,000 yards.

Mr. SLEMP. The best evidence I can get on that is about 23 miles.

Col. RUGGLES. That would be approximately 40,000 yards. I think the Chief of Coast Artillery would be the officer to ask about the use of these guns. The 14-inch gun fired at long range would penetrate the deck armor of any vessel laid down now. At shorter ranges it would go through side armor.

Mr. SLEMP. I had the same objection to suggest to the 16-inch howitzer. It has been stated all along that the object of the long-range gun was to keep vessels from bombarding centers of population, and the 16-inch howitzer comes in the same class with the 14-inch gun.

Col. RUGGLES. The 14-inch gun is especially adapted for the railroad mount.

Mr. SLEMP. That is not in the board of review's project. It is not in any authorized project of the war plans division or of any board at all.

Col. RUGGLES. I think the war plans division has considered the question of railroad mounts, and just at present the 14-inch gun is the largest gun that we are sure we can emplace satisfactorily on a railroad mount, and that will certainly move with the gun on the mount. In the coast-defense project it is a very useful gun. It is a long-range gun, and it will penetrate any deck armor at long range and will penetrate side armor at shorter ranges.

Mr. SLEMP. At the end of this fiscal year we had 11 of them completed, and 6 of them mounted, the other mounts being in process of construction. What will we do with them?

Maj. JENKS. Immediately they will go into storage, except for the guns required for the naval mounts.

Mr. SLEMP. You have already got your guns for the railway mounts?

Maj. JENKS. A part of them. There is at least one railroad mount without a gun.

Mr. SLEMP. You say naval mounts?

Maj. JENKS. Naval mounts; yes, sir.

Gen. PEIRCE. It seems to me that the 14-inch gun has a place in the list of seacoast calibers, just as the 155-millimeter gun has a place in mobile calibers. There are different situations and different purposes. You do not want all of your guns of the heaviest type because all of your targets are not the heaviest targets. The heaviest targets can not approach so close. The 14-inch gun, aside from its seacoast use, would be the heaviest gun that could be handled on railroad mounts for whatever kind of use there might be, just as they were handled during the war in France on naval mounts.

Mr. SLEMP. Of course, what you say there might apply to the 12 and 15 inch guns, or anything else you chose. We have just completed 24 batteries of 12-inch guns and have installed them at various places on our coast on the theory that we might have some use for them in preventing bombardment or close-in fighting, and they argued that the 16-inch gun would keep them farther out. I do not see any place for the 16-inch howitzer and the 14-inch gun. I can not conceive of their use in the United States for Coast Artillery purposes in any fight that would probably come up for many years, and it would be difficult to transport them abroad.

Gen. PEIRCE. We would have to transport them as we did the naval guns.

Col. RUGGLES. I think they have selected places where they will use some of them. I think Gen. Coe can tell you about that. It is a gun of long range and great power, and it is mobile. I think the 16-inch howitzer was made because at certain places they thought they could do the work with a howitzer which did not cost so much as the gun. I think the question to come up soon is whether it is advisable to build any more 16-inch howitzers or whether the 16-inch gun had better be built. If the situation is such that they can reach the target with a howitzer, it is a cheaper piece than the gun; but it is a question whether we must not now do away with the howitzers and use guns instead. That is true, because we now use the gun as a howitzer with high-angle fire, and as the target gets in closer we can reduce the charge for high-angle fire. Formerly we thought that would not be satisfactory in guns, but it now appears feasible.

Mr. SLEMP. At the end of this fiscal year we will have the entire 20 14-inch guns delivered?

Maj. JENKS. We hope to have 25.

Mr. SLEMP. And five new ones. There will be 25 14-inch guns. We have no emplacements for them and no carriages for them, and no authorized use for them, or agreed-upon use for them. Yet we will go right on down the line and make some more.

Maj. RUHLEN. The localities to be assigned for the 14-inch guns are being worked out in the defense projects of various coast areas. They include railroad artillery, and I think you might say that there are places where these guns can be utilized.

DETAILS OF ESTIMATE.

Mr. SLEMP. You are asking \$4,015,000 for next year. I believe you subdivide that into A, B, and C.

Maj. JENKS. Yes, sir. The total A estimates are \$2,535,000; the total B estimates are \$1,185,000, and the total C estimates are \$295,000, making a total of \$4,015,000. The A estimates include \$2,075,000 for the continuation of manufacture, \$100,000 for new manufacture, \$200,000 for new experimental work, and \$160,000 for continuation of experimental work. The \$2,075,000 for continuation of manufacture includes the carrying on of the present project for the 16-inch guns and 16-inch howitzers, and the 14-inch guns and railroad mounts.

Mr. SLEMP. That is, three railroad mounts?

Maj. JENKS. Yes, sir.

Mr. SLEMP. On which you are spending \$70,000 this year?

Maj. JENKS. Yes, sir.

Mr. SLEMP. How much will you spend on this next year?

Maj. JENKS. \$400,000.

Mr. SLEMP. Where will they be built?

Maj. JENKS. At Watertown Arsenal.

Mr. SLEMP. How much will that leave on this project for the following year?

Maj. JENKS. \$430,000.

Mr. SLEMP. For next year?

Maj. JENKS. Yes, sir. There is also included \$150,000 under A for two proving mounts for use at the Aberdeen Proving Ground.

Mr. SLEMP. Did you ask for that last year?

Maj. JENKS. Yes, sir; that was included in the estimates for last year.

Mr. SLEMP. I do not think we need that very much. We do not need those two proof mounts, do we?

Col. RUGGLES. We have no mounts at all.

Mr. SLEMP. What do you mean by proving mounts?

Col. RUGGLES. When we test our projectiles against armor, we have to have a gun and mount to shoot from. It is the same way when we test powder for guns, and that is done from year to year. If anything goes wrong in the service, we have to make a test. We have no proof mount for the 16-inch guns. In the meantime, we are planning to use a barbette carriage and gun costing \$550,000 at the proving ground to make those tests. We will do that until we get a proof mount. In the old days we took obsolete carriages, such as our old barbette carriages, but we have nothing that we can use for the test of the 16-inch gun.

Mr. SLEMP. Does the use of the gun for testing purposes injure the mount you have, or the barbette mount?

Col. RUGGLES. No, sir; but if we have them there, we do not have them at the forts. A regular mount costs a lot more than a proof mount. We are using a very expensive type of mount for proof purposes, and it is not necessary. We have powder enough that we want to test for the 16-inch guns to require these proof mounts. We have powder to test for the 16-inch guns at Panama and powder for the new 16-inch guns, and we can not test it. We will be able to test it temporarily when we get the 16-inch disappearing carriage, but that must go to Fort Michie. We must have some means for testing powder and projectiles at the proving ground.

Mr. SLEMP. You can not improvise anything?

Col. RUGGLES. No, sir.

Mr. SLEMP. That is all right for the \$150,000.

Maj. JENKS. I do not know whether I mentioned the \$150,000 for continuation of work on the 14-inch guns. The balance is for 16-inch guns and howitzers. There is \$300,000 for 16-inch guns and \$600,000 for carriages. There is \$75,000 for 16-inch howitzers and \$400,000 for 16-inch howitzer carriages.

Mr. SLEMP. You have the carriages very much behind the guns in manufacture.

Maj. JENKS. The cost of completing the project is greater for carriages than for guns. We have already on hand gun forgings and howitzer forgings, and our gun cost now is comparatively low. That is the reason why the carriage cost is apparently high. These estimates are based on completing the three 16-inch guns, three 16-inch howitzers, and three 14-inch guns during the coming fiscal year.

WAGES.

Mr. SLEMP. The wage standard at these arsenals is fixed by the rate of pay in the vicinity?

Maj. JENKS. Yes, sir.

Gen. PEIRCE. For work of like character and quality.

Mr. SLEMP. There is not any that could be compared to this in that locality, is there?

Maj. JENKS. Yes, sir; in the locality of Watervliet Arsenal the General Electric Co. has some heavy work that would be very similar to ours, so far as grade of workmanship goes.

Mr. SLEMP. Were wages actually advanced during the war at those various places?

Maj. JENKS. Yes, sir.

Mr. SLEMP. How much?

Maj. JENKS. I would say, offhand, that the present wage scale is at least double the prewar scale.

Mr. SLEMP. The estimates for next year are based upon the theory that they will continue so?

Maj. JENKS. These estimates are; yes, sir; but of course we may have the condition that we had at one of the arsenals this year. They were allotted a certain amount of money to do a certain amount of work, and we found that our labor was much more efficient and we had money that was turned back.

Mr. SLEMP. Where was that?

Maj. JENKS. At the Watervliet Arsenal. Of course, in the case of this work, if our labor is more efficient, we will accomplish more work.

Mr. SLEMP. What percentage of this expenditure goes for labor? For guns it will be almost entirely for labor, will it not?

Maj. JENKS. On this particular estimate, I would say, roughly, 75 per cent. Normally a much smaller amount would go for labor. That is on account of the high cost of forgings which we have already purchased.

Mr. SLEMP. You might get a reflection from the lower cost of material in the purchase of carriages, or in their manufacture?

Maj. JENKS. We will not purchase much material for carriages next year, except for the 14-inch railroad mounts. The 16-inch carriage material required next year is for the most part on hand.

Mr. SLEMP. And the same is true with regard to the howitzer carriages?

Maj. JENKS. Yes, sir. There is some material that we have not got that we must purchase next year. We are going slow on that, however, until we know exactly what we want. In these estimates, when we say that we will complete so many mounts this year, I have not included the completion of the electrical and air equipment. There will be a hangover on that. The main essential parts are included in my figures.

Mr. SLEMP. What do you mean by the air equipment?

Maj. JENKS. The loading is done by compressed air power.

Mr. SLEMP. What sort of hangover will that be?

Maj. JENKS. At the present time we are only manufacturing one set of loading equipment, so that if there is any change required in them, we will not lose material.

Mr. SLEMP. What does it cost?

Maj. JENKS. I should say at least \$25,000 per mount. It may be over that.

Mr. SLEMP. Give us the other items.

PLATFORMS FOR 12-INCH GUNS AND RAILWAY MOUNTS.

Maj. JENKS. The next item is \$100,000 for new manufacture. That includes one-half of the amount required for the manufacture of six all-round platforms for 12-inch guns and railroad mounts. The picture that I showed you of the gun was a 12-inch gun manufactured during the war has no traverse except of a few degrees. We took from an obsolete carriage a racer and base ring and made parts to attach the railroad mount to it. We found that we could use this base ring and make the railroad mount capable of an all-round fire.

Mr. SLEMP. Why could you not do that with the 14-inch Navy mount?

Maj. JENKS. It is not practicable to do it.

Mr. SLEMP. Why not?

Maj. JENKS. On account of the design of the mount. The cost of it would be prohibitive. Of course, it would be physically possible to do it.

Mr. SLEMP. It would turn around?

Maj. JENKS. Yes, sir; it would turn around, but the cost of manufacturing it would be as much or more than the cost of the railroad mount.

Mr. SLEMP. How much would it cost to make the 12-inch platform that you spoke of?

Maj. JENKS. The estimated cost of this is about \$18,000 each, but that does not include the cost of the material which we are salvaging from obsolete seacoast mounts.

Mr. SLEMP. That is the cost of the platform on which you put the 12-inch gun and mount?

Maj. JENKS. Yes, sir. That is the metal part and not the concrete part. It will cost about \$18,000 apiece.

Mr. SLEMP. You place the 12-inch gun and mount on the platform?

Maj. JENKS. Yes, sir; we lock it to the platform.

Mr. SLEMP. Then you have an all-round fire?

Maj. JENKS. Yes, sir.

Mr. SLEMP. Why could you not do that in the case of the 14-inch gun?

Maj. JENKS. It would be too expensive.

Mr. SLEMP. You told me that it cost only \$18,000 to make that change. You simply put it on a concrete block.

Maj. JENKS. This utilizes the turntable, which is worth at least \$25,000.

Gen. PEIRCE. It would not be large enough and strong to put the 14-inch gun and mount upon it.

Maj. JENKS. We have no turntable for the 14-inch gun. It would mean building a turntable, and the cost of the turntable would be excessive on account of the construction of the 14-inch railroad mount.

Mr. SLEMP. What do you suppose one would cost for the 14-inch gun?

Maj. JENKS. I can not give you an offhand estimate on that, because it requires study to see how much material would be required.

Mr. SLEMP. At any event you want some of this money for the 12-inch turntable?

Maj. JENKS. The project here is for one-half of the amount required for six turntables.

Mr. SLEMP. You would turn them over to the railroad artillery section?

Maj. JENKS. Yes, sir; to the Seacoast Artillery. This item originally included \$275,000 for a 16-inch gun turret, which was later abandoned on account of the excessive cost. That was transferred to C. New experimental work covers \$200,000 under A. That is for the inauguration of the manufacture of a superpower gun—that is, a gun of 18 inches or 20 inches caliber—the reason for that being that the design and the building of a gun of supercaliber would require at least 10 years.

Mr. SLEMP. You said seven years last year; you have gone up some.

Maj. JENKS. I am afraid that is experience. It will require from 7 to 10 years. I think the tendency of armament of seacoast fortifications is to supercalibers, or larger calibers than the present 16-inch guns. It is impracticable for the Ordnance Department to construct the guns for any project without having first built a pilot and having tested it out, and also without having first constructed a mount and tested it out.

Mr. SLEMP. What effect do you think it would have on the world, or upon the theory of disarmament, if we made appropriations to build superguns now, when the world is shot to pieces and in bankruptcy, and when we are upon the verge of it?

Maj. JENKS. That is a question that I am not capable of answering. Other countries have or are building them.

Mr. SLEMP. Do the Chief of Coast Artillery, the Secretary of War, and the Chief of Staff all unite in this request?

Maj. JENKS. There was a request received from the Chief of Coast Artillery, either shortly before or shortly after the armistice, for such development.

Mr. SLEMP. That was back in 1918.

Maj. Jenks. And these estimates that are submitted have received the approval of the War Department.

Mr. SLEMP. If it came in under experimental work, it might get by without their knowing it. How much would an 18-inch gun with its carriage cost?

Maj. JENKS. At least \$1,000,000.

Mr. SLEMP. And you want to spend \$200,000 of that next year?

Maj. JENKS. Yes, sir.

Mr. SLEMP. You have no design for it now, have you?

Maj. JENKS. We have one design of an 18-inch gun, but in case we build an 18-inch gun, it will be a question of rechecking that design.

Mr. SLEMP. What else have you?

CONTINUATION OF EXPERIMENTAL WORK.

Maj. JENKS. The next is "continuation of experimental work. \$160,000." That includes \$105,000 for the development of fire-control work; \$15,000 for the completion of 16-inch howitzer railway mount; \$20,000 for interior and exterior ballistic work; \$5,000 for metallurgical investigations; \$15,000 for miscellaneous work. The fire-control items represent the development of matériel suitable for fire control of antiaircraft artillery and long-range seacoast artillery, upon which much work remains to be done. We are attempting now to develop the sights and some instruments for anti-aircraft artillery. We are, of course, utilizing the instruments which we purchased abroad, and which are of a much higher development than any we have previously made in this country. The principal work under the estimates is the development of fuse setters correction of fire instruments, night-fire instruments, and transmitters of fire-control data. In the case of seacoast matériel it is largely a question of developing something to take the place of the plotting board for long-range guns and developing observation instruments for balloons and airplane work, perfecting the internal base range finders, and also a little work on sound and flash range finding, and some work on mechanical devices for correcting ranges for 16-inch matériel. Our present fire control for seacoast artillery was developed when 15,000 yards was the maximum range.

Mr. SLEMP. Is your organization the one that does this research and development work?

Maj. JENKS. Yes, sir; we are carrying on research and development in fire-control instruments.

Mr. SLEMP. Does not the Signal Service have something to do with that?

Maj. JENKS. With the electrical end; yes, sir. The Signal Corps handles the electrical end and the Ordnance Department handles the observing and range-finding instruments.

Mr. SLEMP. As to the subaqueous item, I thought that would come in under fire control, that this whole business would be taken up under fire control?

Maj. JENKS. These items have not been included in the appropriation for fire control at fortifications.

Mr. SLEMP. Should they not be?

Maj. JENKS. I suppose, as a matter of fact, that they should be included in that appropriation, although it has grown to be the custom to utilize this appropriation for that purpose.

Mr. SLEMP. Have you spent any money along that line during this fiscal year?

Maj. JENKS. Yes, sir.

The CHAIRMAN. How much?

Maj. JENKS. Out of this year's appropriation we expect to allot \$35,000 for fire-control work.

Mr. SLEMP. You are asking for quite a lot more the coming year?

Maj. JENKS. Yes, sir. The material which is under development is under orders given during the fiscal year 1920, and that is the reason for the apparently unfavorable comparison between this year's and next year's work. There is a tremendous amount of work to be done.

Mr. SLEMP. Of course, you would not expect to work up the subaqueous item?

Maj. JENKS. This is for the flash and sound range finding for field work.

Mr. SLEMP. This is a seacoast item?

Maj. JENKS. It is in connection with railroad and heavy tractor guns requested by the Chief of Coast Artillery.

Mr. SLEMP. Is there any other item in which you are interested?

Maj. JENKS. There is one item to be considered.

Mr. SLEMP. Proceed.

SEACOAST CANNON—INSULAR POSSESSIONS.

Maj. JENKS. "For purchase, manufacture, and test of seacoast cannon, including the necessary experiments in connection therewith, and the machinery necessary for its manufacture," for the insular possessions the appropriation this year was \$250,000 cash and a contract authorization of \$300,000. The contract authorization has been used for the purchase of two sets of forgings for 16-inch guns, and on December 31 there had been allotted \$136,300 and unallotted \$113,700. Since that date about \$90,000 has been allotted and the rest of it will be allotted this year for the construction of two 16-inch howitzer carriages. The estimate next year under this appropriation—

Mr. SLEMP (interposing). I thought you said that you had paid for the forgings?

Maj. JENKS. The forgings come under the contract obligations which we are asking to be converted into cash.

Mr. SLEMP. The \$250,000 was for that?

Maj. JENKS. No, sir; that was for use on carriage work. The \$300,000 was authorized for the forgings themselves.

Mr. SLEMP. What will be the total cost?

Maj. JENKS. The total cost of this project will be \$1,100,000. There will be required after this fiscal year \$863,000.

Mr. SLEMP. That is included in the cash and the \$300,000 authorization?

Maj. JENKS. Yes, sir; we are asking for \$750,000, which includes the \$300,000.

Mr. SLEMP. That also presumes that the price cost of material and the present wage scale will continue?

Maj. JENKS. Yes, sir. Of course, if we can get any greater efficiency out of the labor we will either turn back funds or accomplish a greater amount of work.

Mr. SLEMP. And the same with the material?

Maj. JENKS. The material for this is on hand. There will be no saving in material.

Mr. SLEMP. If it is on hand the unit cost ought not to be in cash as much as \$500,000, if you have your material out of the Government's stock?

Maj. JENKS. That is the total estimated cost of the material. That, of course, includes the work done and the material on hand. The gun forgings are still to be paid for—being contracted for under the contract authorization.

Mr. SLEMP. If you have the steel on hand——

Maj. JENKS (interposing). It is paid for out of this year's appropriation.

Mr. SLEMP. Have you already paid for it?

Maj. JENKS. Some of it—either paid for or obligated. There is no material which is available for use under this item without charging it against the appropriation.

Mr. SLEMP. I understood that, but any material which would be delivered in the future—coal is going down, steel is going down, iron is going down—would likely be cheaper?

Maj. JENKS. They are all covered by contract. This also includes \$33,000, which is half of the cost of 16 mortar-transport cars for the 12-inch mortar mounts which were requested by the Chief of Coast Artillery. These estimates are based on delivering one gun carriage next-year and the other items the year after.

TUESDAY, FEBRUARY 8, 1921.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION FOR SEACOAST CANNON.

Mr. SLEMP. The next item is for purchase, manufacture, and test of ammunition for seacoast cannon, armament of fortifications H. You had for this fiscal year \$1,000,000, and I think you also had some war funds hanging over for expenditure this year. Will you make a statement as to the use of the money this fiscal year and then explain your estimate of \$3,841,786 for the coming fiscal year?

Gen. PEIRCE. Out of the \$1,000,000 for the present year there is an unreserved or free balance of \$263,479.27.

CURRENT YEAR EXPENDITURES.

Maj. DAVIS. You want first the use of the 1921 funds and then the use of the older funds?

Mr. SLEMP. That is right.

Maj. DAVIS. The 1921 funds are divided into various projects which I will read: For the completion of the manufacture of 400 14-inch armor-piercing projectiles, \$3,000. That was an order which was placed at the Watertown Arsenal and not completed. For fuses for projectiles which were authorized out of war funds last

year, \$2,500; for cartridge storage cases for propelling charges for projectiles which were authorized out of war funds, \$150,000; for loading approximately 30,000 armor-piercing projectiles which were produced during the previous fiscal year——.

Mr. SLEMP (interposing). Of what calibers?

Maj. DAVIS. Of 6-inch, 8-inch, 10-inch, 12-inch, and 14-inch, but principally 12-inch; the amount is \$113,700; fuses for re-fusing approximately 109,000 projectiles in the coast defenses, \$191,975; for ballistic investigations, \$15,000; for development of propellant powders, \$25,000; for the development of base detonating fuses, \$90,000; for experimental loading of armor-piercing projectiles, \$17,500; for the development of propelling charges, \$8,000; for the replacement of fuses in 3-inch 15-pounder seacoast ammunition, \$13,650; for the part manufacture of 400 14-inch armor-piercing projectiles at Watertown Arsenal, \$55,600. There is other money on that under A. of F., Panama Canal, "H," \$260,000; making the total of that order, \$315,600; for the checking, cleaning, and storing of gauges, \$25,000; turned over to the technical staff for firings at Aberdeen Proving Ground, \$24,115; for transportation, \$6,500; for payment of the allotment roll, \$26,200; for additional firings at the proving ground, for ammunition division tests, \$90,000; for the manufacture of propelling charges to fill existing deficits, \$55,000; for the development of base detonating fuses, \$25,000; for further work on propelling charges, \$12,260, and of the unobligated balance there has been set aside \$50,000 additional for tests at the proving ground which has not yet been definitely allotted.

Mr. SLEMP. That is a part of the so-called reserve that Col. Ruggles referred to yesterday afternoon?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. Do you expect to obligate the two hundred thousand and odd dollars before the end of the present fiscal year?

Maj. DAVIS. Yes, sir; that will be fully obligated before the end of the present fiscal year.

Mr. SLEMP. For what purposes will that be obligated?

Maj. DAVIS. Since that obligation statement has been made up, the remainder has been obligated.

Mr. SLEMP. To complete the items which you have just mentioned?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. Now what about your war funds?

Maj. DAVIS. It was stated before the committee last year that it was desired to use approximately \$1,295,280 of war funds and 1919-20 funds; that is, funds previous to last year, for the purchase of projectiles, fuses, and for experimental work. The actual expenditure under A. of F., "H." continental United States, was \$3,371,951, or \$2,076,671 more than was stated before the committee would be spent under A. of F., "H." You will find that under F. I. P. "H," and Panama Canal, "H," that less was spent, so that the total actually spent under fortifications, "H," for the three items, comes out as was promised to the committee.

Maj. HARRIS. The reason for that was that in the recovery bill the balances were such that we had to do that.

Maj. DAVIS. The money under "H" was used for the manufacture of 3,950 12-inch armor-piercing projectiles; 1,000 14-inch armor-

piercing projectiles, and 250 16-inch armor-piercing projectiles, and \$245,000 of that was spent for the manufacture of cartridge storage cases for the projectiles that were manufactured, and the inspection and transportation incidental to the manufacture of the projectiles, fuses, and cartridge storage cases. Deliveries on those orders for projectiles of 12 and 14 inch are now being made; the deliveries of 16-inch projectiles have been held up due to difficulties of the contractors in meeting the later specifications for 25-degree impact.

Mr. SLEMP. Generally speaking, where are these 12, 14, and 16 inch shells made?

Maj. DAVIS. They are made by the Bethlehem Steel Co., the Midvale Steel Co., and the Washington Steel & Ordnance Co. The Bethlehem Co. and the Midvale Co. are making the 16-inch projectiles.

MANUFACTURE OF PROJECTILES AT WATERTOWN ARSENAL.

Mr. SLEMP. Do you not do any of that manufacturing at Watertown Arsenal?

Maj. DAVIS. None of the 16's. The Watertown Arsenal now has two orders for 14-inch armor-piercing projectiles; one is a hang-over order of 400, for which that \$3,000 was allotted, and another is an order for 400 that was placed during the present fiscal year. That makes 80 projectiles to be manufactured at Watertown, and it is expected that that manufacture will hold over until next year.

Mr. SLEMP. Has that work been successfully done there?

Maj. DAVIS. Watertown has not as yet made the higher angles of impact that commercial manufacturers have.

Mr. SLEMP. What is the cost of Government manufacture as compared with private manufacture?

Maj. DAVIS. I can not say as to the 14-inch, because Watertown has only done experimental work on these two orders of 400 each. On previous orders the costs have been somewhat more than those of commercial contractors.

Mr. SLEMP. How much?

Maj. DAVIS. Ten or fifteen per cent more.

Mr. SLEMP. Do you think those 800 shells will be good ones to use?

Maj. DAVIS. We hope so; yes, sir.

Mr. SLEMP. Have you tested any of them so far?

Maj. DAVIS. We have tested three of them, which have not met the specifications; since those have been tested Watertown Arsenal has gotten considerably more information from the commercial manufacturers and is making up additional test projectiles now.

Mr. SLEMP. What protection has the Government in case an arsenal does not do good work? You could refuse to accept the product of a commercial establishment, but what is our protection in the arsenals?

Maj. DAVIS. None; the money is gone if they make a poor projectile.

Mr. SLEMP. Do they not work under contract?

Maj. DAVIS. No, sir.

Gen. PEIRCE. There would not be anything behind such a contract.

Maj. DAVIS. And there would be no place for them to get money with which to replace the material.

Mr. SLEMP. It costs more to get the work done and you do not have that protection?

Maj. DAVIS. No, sir.

Mr. SLEMP. It is not a very encouraging proposition, then, is it?

Maj. DAVIS. Except that everything that is done at a Government arsenal is checked; the department has complete records of all experimental and development work, which allows the department to make specifications and have a check on the projectile manufacturers as to costs. In other words, if we did not have any work going on at Watertown Arsenal at all, as far as the prices of armor-piercing projectiles are concerned, we would be absolutely at the mercy of the manufacturers.

Mr. SLEMP. But you would call these 800 production and not experimental?

Maj. DAVIS. Yes, sir; but I said even if we did not do any work at the arsenals experimentally.

AMMUNITION SUPPLIES.

Mr. SLEMP. That brings you up to this fiscal year. What is the situation as to our ammunition supplies for the seacoast defenses, say, at the end of this fiscal year, the types of guns, sizes, etc.?

Maj. DAVIS. For the 3-inch antiaircraft gun——

Mr. SLEMP (interposing). You have a board of review project, have you not, generally speaking?

Maj. DAVIS. We have a board of review project augmented by an additional study, increasing the accuracy life allowance of seacoast guns, as a result of the experience of this war, which is an addition to the board of review's project and which has received the approval of the Secretary of War.

Mr. SLEMP. You mean that was made by the War Plans Division of the General Staff?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. What is their general proposition on that?

Maj. DAVIS. It increases the accuracy lives of all the guns.

Mr. SLEMP. To what?

Maj. DAVIS. Well, you can say, roughly, that it pretty nearly doubles the accuracy life that we had before.

Mr. SLEMP. Is it the policy to keep on hand near each battery enough ammunition for these guns?

Maj. DAVIS. Yes, sir; there has been no change in the policy to build up at the battery itself its full battle allowance.

Mr. SLEMP. In addition to that, are you collecting a reserve?

Maj. DAVIS. No, sir. This has reference to the seacoast guns on fixed mounts; the railway guns are in a little different category, and they have an allowance of high-explosive shell, some of which are kept at base depots. For the 3-inch antiaircraft guns the total shell required for the allowance of all guns is 397,500 rounds; the total available is 12,500 loaded and 13,061 unloaded, leaving a deficit—counting the unloaded as finished projectiles—of 371,939. That gun has come in since the board of review's project.

Mr. SLEMP. What gun are you referring to?

Maj. DAVIS. The 3-inch antiaircraft gun.

Mr. SLEMP. Is that all the ammunition we have for use in the 3-inch antiaircraft gun?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. Have we any ammunition, in any other branch of the service than the seacoast, that could be used for this purpose?

Maj. DAVIS. No, sir.

Mr. SLEMP. Do you get any under "C"?

Maj. DAVIS. No, sir; all of the 3-inch antiaircraft guns are assigned to the Coast Artillery. There is a 75-millimeter antiaircraft ammunition, but that is not used in this gun; under "C" you get 75-millimeter antiaircraft guns for which there is more ammunition, but for the 3-inch antiaircraft seacoast gun there is only this amount.

Mr. SLEMP. You are getting away from that gun, are you not?

Maj. DAVIS. No, sir; that is the accepted 3-inch antiaircraft gun.

Mr. SLEMP. I thought they were going to a larger length.

Maj. DAVIS. They are going to larger calibers for the mobile artillery, but the 3-inch antiaircraft gun is the present approved gun for the seacoast. For the 3-inch 15-pounders, model of 1902 and 1903—that is more or less of an obsolescent weapon; the Chief of Coast Artillery has stated that he does not desire any further reserves built up for that gun. The requirements for the 1902 model are 122,000 rounds and for the 1903 model 202,000 rounds, a total of 324,000 required, with available 58,153, leaving a deficit of 265,000.

Mr. SLEMP. That being obsolescent, you would not care for that?

AMMUNITION FOR 6-INCH GUNS.

Maj. DAVIS. We are not making any provision to augment that reserve at all. For the 6-inch guns of all models, the total ammunition required is 150,000 rounds; the total ammunition available is 171,500 rounds, or a surplus of 21,500 rounds. That surplus has arisen because of the fact that now everything below 12 inches in caliber is considered a non-armor-piercing gun, so that we have made available for the 6-inch sea-coast guns all 6-inch high-explosive shell which were manufactured during the war. For the 6-inch sea-coast guns that were taken off their sea-coast mounts and put on wheel mounts, and which have since been declared obsolete——

Mr. SLEMP (interposing). Does that include the 73 6-inch guns that you took to France?

Maj. DAVIS. The number of guns for which I gave you the total requirements just now are those that remain in the coast defenses.

Mr. SLEMP. What became of the 73?

Maj. DAVIS. The 73 that were put on wheel mounts! The wheel mounts were declared obsolete and the guns themselves were put in storage.

Mr. SLEMP. At the Aberdeen Proving Ground?

Maj. DAVIS. I am not sure where they were placed.

Mr. SLEMP. Did you use those 6-inch guns in France?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. Were they on the battle front?

Maj. DAVIS. I can not say whether any of the 6-inch actually got on the front or not, but I do not believe they did.

Mr. SLEMP. What was your experience there with the firing of those guns?

Maj. DAVIS. You mean on the wheel mounts?

Mr. SLEMP. Over in France.

Maj. DAVIS. Well, they were satisfactory guns as far as firing went.

Mr. SLEMP. The report was that they were not satisfactory.

Maj. DAVIS. That was on account of the immobility of the carriage.

Mr. SLEMP. No; it was on account of the inaccuracy, the wide dispersion and the lack of range—so it was reported.

Maj. DAVIS. I have not seen that report, sir.

Mr. SLEMP. At any rate, you are not using them now at all?

Maj. DAVIS. No, sir; those wheeled carriages have been scrapped and the guns themselves have been put in storage as spares.

Mr. SLEMP. You make a distinction, so far as the 6-inch gun is concerned, between armor-piercing shell and shot, and the figures you have read off are for shell.

Maj. DAVIS. No, sir; that is not quite right. The total requirements of 150,000 are made up of both armor-piercing shot and shell as well as high-explosive shell; in other words, there are three classes. There was an old distinction as to armor-piercing projectiles, of a shot with small capacity for piercing armor and bursting inside, shell of high-explosive capacity for bursting outside the armor, and the field artillery or common field shell for land target work. In the 6-inch, the 8-inch and the 10-inch—all of those three have been grouped together—we are making up the authorized allowances for those guns with any projectiles we have; in other words, anything below 12-inch is not considered a gun capable of attacking armor plate.

Mr. SLEMP. You really do not seriously regard them as of any use in the case of a severe attack?

Maj. DAVIS. No, and therefore we are simply filling up their allowance with any projectiles we have. The armor-piercing shot and shell will both do for transports and destroyer work, or for some of the very much lighter cruisers.

Mr. SLEMP. Have you plenty of ammunition of that type on hand?

Maj. DAVIS. For the 6-inch caliber, we have an excess of 21,500 rounds; for the 8-inch caliber, we have an excess for seacoast guns alone of 88,000 rounds. Some of that must, however, be applied to 8-inch guns on railroad mounts.

Mr. SLEMP. You can do that, having that large surplus of 88,000 rounds?

Maj. DAVIS. Yes, sir. For the 10-inch we have a surplus of 69,215 rounds. That is in the same category as the 8-inch.

Mr. SLEMP. You make no distinction between shot, shell, and high explosives?

Maj. DAVIS. No, sir; not in these calibers.

Mr. SLEMP. As a matter of fact, what would be the percentage of so-called armor-piercing shot in that?

Maj. DAVIS. For the 6-inch caliber, the total of armor-piercing ammunition available is 51,322 rounds. That is out of a total requirement of 150,000 rounds. Of that 51,322 rounds 41,017 rounds are armor-piercing shell, and the difference of some 10,000 rounds is armor-piercing shot. Of field shell there are loaded 70,021 and unloaded 50,148.

Mr. SLEMP. Have you a statement of the number of 8-inch and 10-inch guns at present in the seacoast defenses?

Maj. DAVIS. Yes, sir; I can furnish that.

Mr. SLEMP. Are the ammunition and supplies for the 6-inch, 8-inch, and 10-inch guns in good shape and serviceable?

Maj. DAVIS. There are deficits. Those figures I have given you apply to our projectile surplus. In other words, in the coast defenses there are not powder charges in step with the projectiles. The bulk powder is on hand and the silk cartridge bags are on hand, as well as the black powder for the igniters. The cartridge storage cases are not all on hand, and in the estimates for 1922 we are asking for money to complete the rounds that are now in the coast defenses in the form of projectiles.

CARTRIDGE STORAGE CASES.

Mr. SLEMP. What have you expended for storage cases?

Maj. DAVIS. We spent \$150,000 on that.

Mr. SLEMP. What equipment have you now in connection with your present storage-case facilities?

Maj. DAVIS. For the manufacture of storage cases?

Mr. SLEMP. With what you have now, how much do you lack of having enough to fill up?

Maj. DAVIS. This is for continental United States.

Mr. SLEMP. Is all of this discussion about continental United States?

Maj. DAVIS. No, sir; these projectiles are applied to all three places—continental United States, the insular possessions, and Panama. I was referring to the cartridge storage cases in continental United States, insular possessions, and Panama. In continental United States we have figured the shortages of cartridge storage cases on the projectiles in sight. In other words, we have divided the cartridge storage cases into two classes, first, to provide sufficient cartridge storage cases so that every projectile in batteries or under order will have one propelling charge with it, and, second, the cartridge storage cases are included in the estimates for any new ammunition. In the estimates for this year, if we ask for 500 armor-piercing complete rounds, it is a complete round, and the cost includes the cartridge storage case cost, the making up of the powder, the making up of the bag, the assembling of the powder charge, putting it in the cartridge case, manufacturing the fuse, and loading the projectile, so that in the matter of projectiles we will not run into the situation that we have now of projectiles in the coast defenses with no powder on hand.

Mr. SLEMP. You will give the situation with regard to the two classifications.

Maj. DAVIS. The situation in regard to the cartridge storage cases, to fill deficits in accordance with the projectile supply, is as follows: For the 6-inch caliber for continental United States, there is a deficit of 4,236 cartridge storage cases.

Mr. SLEMP. How much will they cost?

Maj. DAVIS. The cost of the 6-inch cartridge storage case is \$4.

Mr. SLEMP. How many of the 6-inch cartridge storage cases have you on hand?

Maj. DAVIS. Twenty-two thousand and twenty-three. Of the 8-inch caliber, there is no deficit, and of the 10-inch caliber there is no deficit.

Mr. SLEMP. Will your expenditure of \$150,000 this year make up the deficit in the 6-inch caliber?

Maj. DAVIS. No, sir; because these figures I am giving you are taken after the \$150,000 is applied. The amount that I gave you as on hand is on hand or under order with funds already authorized, and if we got no more money, that is what we would have.

Mr. SLEMP. With your cartridge storage cases proposition out of the way, you would regard your ammunition for the 6-inch, 8-inch, and 10-inch guns in continental United States as a settled proposition, with the ammunition on hand at the various defenses?

PROPELLING CHARGES.

Maj. DAVIS. With the propelling charges, we could.

Mr. SLEMP. How much do you lack on that?

Maj. DAVIS. The propelling charges are always behind the cartridge storage cases. You can not make the propelling charge until you have the cartridge storage case to put it in. On the 6-inch caliber, the deficit of charges is 14,570.

Mr. SLEMP. Is it a difficult matter to assemble them?

Maj. DAVIS. No, sir; it is simply a question of cost. The cost of that is \$4.50 per charge.

Mr. SLEMP. Do we have any organization anywhere that is working on that now?

Maj. DAVIS. Not on the 6-inch, because there are no funds available for this caliber. We are concentrating on the armor-piercing calibers, or on the 12-inch, 14-inch, and 16-inch. In the 8-inch caliber, there is no deficit of cartridge storage cases, but there is a deficit of 2,460 rounds, so far as charges are concerned. For the 10-inch caliber there is no deficit of cartridge storage cases, but there is a deficit of 8,185 charges. I have these same figures for the Insular possessions and Panama.

AMMUNITION SUPPLIES.

Mr. SLEMP. Referring to the 12-inch, 14-inch, and 16-inch ammunition supply, as it will exist at the end of this fiscal year, will you furnish a statement as to the character of the supply on hand, the amount on hand, and the locations?

Maj. DAVIS. The total armor-piercing ammunition required for the 12-inch is 45,633 rounds; the total of 12-inch projectiles available to apply against this requirement for all three models, because the projectile is the same for all three models, is 25,766, leaving a deficit of 19,867 projectiles.

Mr. SLEMP. Do you make a division there between shot and shell?

Maj. DAVIS. I would like to explain that: The previous distinction between shot and shell has been abolished in all new manufacture of armor-piercing projectiles.

Mr. SLEMP. That is, you have abolished the shot?

Maj. DAVIS. No, sir; they have abolished the shell. We now call them armor-piercing projectiles, and they correspond practically to the old armor-piercing shot. We call them projectiles in order to make a definite dividing line.

Mr. SLEMP. Does your statement of 25,000 projectiles include both shot and shell?

Maj. DAVIS. Yes, sir; both shot and shell.

Mr. FRENCH. Of what size?

Maj. DAVIS. Twelve inches.

Mr. FRENCH. What is the other size?

Maj. DAVIS. Both are 12 inches.

Mr. SLEMP. This deficit of 19,000 that you spoke of includes what you expect to get in the way of deliveries this year?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. You have practically doubled the accuracy life of these guns, and that creates a deficit?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. The distinction that is made between shot and shell was brought about because of the experience of the British and German navies, was it not?

Maj. DAVIS. Yes, sir. As a result of that, the Chief of Coast Artillery decided, and the decision was approved, that hereafter no armor-piercing shell would be manufactured, and that the armor-piercing shell now on hand would be considered as an obsolete projectile.

Mr. SLEMP. But it is included in your amount?

Maj. DAVIS. Yes, sir; it is included. It is to be considered as an obsolete projectile in that it should be replaced as soon as it can be.

Mr. SLEMP. It would not be considered obsolete against the deck of a vessel?

Maj. DAVIS. No, sir.

Mr. ANTHONY. What would you replace it with?

Maj. DAVIS. With another projectile, or with the so-called armor-piercing projectile. That is, what used to be called the old armor-piercing shot.

Col. RUGGLES. This will not penetrate the deck of a modern battleship. It is a heavy-walled shell, but it will not penetrate the armor of any battleship now being laid down in our country.

EXPLOSIVE SHELLS.

Mr. ANTHONY. Do you use explosive shells in any big guns?

Maj. DAVIS. Yes, sir; all explosive shells.

Mr. ANTHONY. The principle is to secure penetration?

Maj. DAVIS. Yes, sir.

Mr. ANTHONY. That was the primary idea of the explosive shell?

Maj. DAVIS. The primary idea of the armor-piercing shot is to go through the armor and get inside of the boat.

Mr. ANTHONY. We were told that during the war some of the most important fortifications were destroyed by explosive shell. We were told that certain fortifications in Belgium were destroyed in that way.

Maj. DAVIS. Yes, sir.

Mr. ANTHONY. Those were not armor-piercing shells, but just explosive shells.

Maj. DAVIS. They were explosive shells.

Mr. ANTHONY. Do you use any of that type?

Maj. DAVIS. Not for seacoast guns.

Mr. ANTHONY. Why would it not be possible to use them in firing?

Maj. DAVIS. The accuracy life of those guns is limited and the cost is extremely high. The battleship which is the armored target for the seacoast gun is not vulnerable to the high-explosive shell.

Col. RUGGLES. That projectile simply means a heavy-walled shell, and it carries an explosive charge in it. When fired from the seacoast gun the purpose is for it to go through and explode inside.

Mr. ANTHONY. Then, if the armor-piercing shell carrying that explosive charge explodes on the outside of the ship, it does not do any harm?

Col. RUGGLES. It will not sink the ship.

Mr. ANTHONY. If I remember correctly, in the test involving the *Indiana* the greatest destruction was wrought by an explosive shell or torpedo which was fired near the stern of the ship.

Col. RUGGLES. It was done by a bomb that was dropped overboard very close to the hull of the ship and underneath the belt armor. That was what sunk the ship.

Mr. ANTHONY. That has been used as the basis for the argument that the explosive shell was the most powerful——

Col. RUGGLES (interposing). All of our shells are explosive shells.

Mr. ANTHONY. Why can you not use a shell that carries a heavy explosive charge and that will explode on the exterior of the ship?

Col. RUGGLES. It will not answer the purpose.

Mr. ANTHONY. Has that been demonstrated?

Col. RUGGLES. Yes, sir; for 20 years.

Mr. ANTHONY. Can you fire such a shell loaded with enough high explosive to accomplish the purpose?

Gen. PEIRCE. There is a distinction that should be made. Certain parts of a ship are not armored. The explosive shell of the type you speak of would damage those unarmored parts, but it would not seriously damage the armored parts.

Mr. SLEMP. This whole thing was brought out in the battle of Jutland, in which the English fleet was using what is technically called shell, and as a result of their experience there they went back and changed their shell to shot. We have abandoned the terms shot and shell for the first time in the hearings now and we call them projectiles.

Gen. PEIRCE. I think that this statement would, perhaps, clear the situation: The object of attack is not the armor, but what the armor protects, and, to that end, we desire to get a projectile loaded with high explosive through the armor, and then to detonate it where it will damage or destroy that which the armor is put there to protect, and it must be strong enough to go through that armor.

Mr. ANTHONY. I know that is the old idea, but I have been impressed with the fact that the modern idea was to explode a charge of high explosives near the fortifications or ships and blow them to pieces from the outside.

Gen. PEIRCE. That proposition has been advanced at different times as long as I have been in the service. It comes up periodically. To my own knowledge those tests have been repeated a great many times, and I think it has been established beyond question that the detonation of any quantity of high explosives that so far has been carried in a shell on the exterior of armor has produced no very important effect.

Mr. ANTHONY. I think I asked this question six or eight years ago of Gen. Crozier—that is, why they did not use large high explosive shells in the 12-inch guns at Sandy Hook, and if I remember his answer correctly, it was that it was unsafe to fire those charges at

certain temperatures, or that if the ammunition was either too cold or too hot it was unsafe to use it in the guns.

Col. RUGGLES. We made a very elaborate series of experiments in the Navy in regard to that. In the course of those experiments they took the actual projectiles and fired them against the sides of the ships, and they were placed right alongside the armor. When they were exploded right alongside the armor all the damage that they did was to shove the armor back. That is something that has been demonstrated. Mr. Isham is the great exponent of that, and later on it was taken up by Mr. Gathmann. That has been tried over and over again, and it does not do the damage. As for the *Indiana*, that was not done by a shell, but by a bomb. They did not drop that bomb, but they laid it right alongside the ship.

Mr. ANTHONY. Now, it is conceded that if you take a torpedo, you can carry a large enough charge of explosive in it so that if it is fired against the side of a ship it will sink it, and it seems to me that if you fired in one of your 14-inch or 16-inch seacoast guns a large enough charge of high explosive, so that if it landed against the side of a ship it would explode in the same manner as the torpedo, it would do the same damage that a torpedo would.

Col. RUGGLES. No, sir; it would not, because we can not carry that much charge. That is also explained by the fact that the torpedo if it struck the armor would not damage the ship. It does damage the ship by striking underneath the armor. In the case of any of the ships that are building now, it would take at least three mines, carrying 600 pounds of explosives each, to sink any of them. The modern battleship that is now being laid down is almost absolutely protected against any kind of fire that does not penetrate her armor. As regards bombs, or the possibility of dropping three of them containing 600 pounds of explosive each, either on the ship or so close as to damage her, is a thing that is yet to be demonstrated. The Air Service men may do that in the future, but they do not do it now.

Mr. ANTHONY. What is the largest amount of explosive that you can fire from a big gun?

Col. RUGGLES. I suppose they can carry 150 pounds in the 16-inch guns.

Gen. PEIRCE. There is another thing to be considered, and that is that the torpedo derives most of its effect from the fact that it explodes under water, and it has the weight of the water to confine the explosion. It would be a different thing if the torpedo was put on a ship or was exploded in the air where it did not have the tampering effect of the water.

Mr. SLEMP. Major, have you finished that statement?

Maj. DAVIS. Yes, sir.

AMMUNITION FOR 12-INCH MORTAR.

Mr. SLEMP. What about the 12-inch mortar?

Maj. DAVIS. Of the 12-inch mortars, the total requirements for projectiles is 207,640, divided into 700 pounds, 824 pounds, and 1,040 pounds for the various zones. There are available 68,539 projectiles, leaving a deficit of 139,101.

Mr. SLEMP. Have you any possibility of getting any 12-inch projectiles from the Navy?

Maj. DAVIS. No, sir.

Mr. SLEMP. Or from any other source?

Maj. DAVIS. No, sir.

Mr. SLEMP. The Army does not use 12-inch guns outside of the seacoast defenses?

Maj. DAVIS. No, sir. There are 12-inch guns on railroad mounts.

Mr. ANTHONY. Is your ammunition interchangeable with that of the Navy?

Maj. DAVIS. No, sir.

Mr. ANTHONY. For some sizes of guns?

Maj. DAVIS. Not in all cases. The powder charge is different in a good many cases, and the projectile is different.

Mr. SLEMP. These mortars are practically of no use except for close-in firing, and then at the decks of vessels?

Maj. DAVIS. Yes, sir; they are entirely for attacking deck armor.

Mr. SLEMP. You regard this as an obsolete proposition?

Maj. DAVIS. Obsolescent, but not obsolete.

Gen. PEIRCE. They are getting so but are not so yet.

Mr. SLEMP. You would not want to spend money on them?

Maj. DAVIS. No, sir, and I might say that in the estimates we are not making any effort to fill up that deficit.

Mr. SLEMP. In the case of the 12-inch gun and howitzer?

Maj. DAVIS. In the 12-inch caliber; yes, sir, but not in the 12-inch mortar. We are asking for money there to balance the projectiles which we now have on hand.

Mr. ANTHONY. What is the life of this ammunition?

Maj. DAVIS. The armor-piercing ammunition?

Mr. ANTHONY. Yes, sir.

Maj. DAVIS. The propelling charge has a life of approximately 15 years, and the armor-piercing projectile itself has an indefinite life. The explosive with which it is loaded, so far as we know now, has a practically indefinite life. There are certain parts of the fuze which are subject to deterioration, but the fuze can be taken out and those parts replaced at relatively small expense.

AMMUNITION FOR 14-INCH GUNS.

Mr. SLEMP. Now, the 14-inch? Are those in place?

Maj. DAVIS. Yes, sir. The total requirements for those are 5,520 rounds, of which there will be available after the present contract is completed 4,649 rounds or a deficit of 871 rounds, which we are not asking for this year.

Mr. SLEMP. In that connection, the shells that Mr. Anthony was speaking about for the 14-inch guns, the Army has a lot of those?

Maj. DAVIS. Of the 14-inch shell there are only 1,266.

Mr. SLEMP. Which the Army collected for use of these guns in France?

Maj. DAVIS. I beg your pardon. I was speaking of the 14-inch armor-piercing shell. For the 14-inch high explosive shell I have not that figure.

Mr. SLEMP. You transferred most of the 14-inch guns to the Seacoast Artillery?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. And therefore the ammunition ought to be transferred to the seacoast ammunition supply?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. You will need that?

Maj. DAVIS. Yes, sir. These 14-inch guns are in fixed emplacements and they take only armor-piercing ammunition.

Mr. SLEMP. Take the Navy, it has an enormous amount of 14-inch projectiles.

Maj. DAVIS. We are getting their full surplus of armor-piercing projectiles which will penetrate. That is about 5,000 projectiles.

Mr. SLEMP. You are getting those?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. Will not that make up all possible deficit?

Maj. DAVIS. Those projectiles are being assigned to the 14-inch guns which are to be mounted on railway mounts.

Mr. SLEMP. They wrote us last year that there were 20,000 of these projectiles?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. You are only getting 5,000?

Maj. DAVIS. We went into the 20,000 and found that there were only 5,000 which would negotiate armor.

Mr. SLEMP. You are not asking for any money for the 14-inch projectiles?

Maj. DAVIS. No, sir.

Mr. SLEMP. Does that apply to Panama, the Philippine Islands, and Hawaii?

Maj. DAVIS. Yes, sir; we are not asking for any 14-inch projectiles.

Gen. PEIRCE. There are 1,800 high-explosive 14-inch shell.

Mr. SLEMP. They will be transferred to the Seacoast Artillery for use either on railroad mounts or in the seacoast defenses?

Maj. DAVIS. Only on railway mounts.

Mr. SLEMP. That will obviate the necessity of getting an additional supply of 14-inch projectiles for the railway guns?

Maj. DAVIS. The railway guns are figured on a somewhat different basis from the seacoast guns.

AMMUNITION FOR 16-INCH GUNS.

Mr. SLEMP. Now, the 16-inch?

Maj. DAVIS. There is mounted actually only one 16-inch gun, model 1895, at Panama. There are six 16-inch and four 16-inch howitzers which will be completed by the end of the fiscal year 1922.

Mr. SLEMP. What have you on hand?

Maj. DAVIS. We have on hand 650 armor-piercing shot, plus 38 which are actually on hand, but which were purchased at a reduction in price because they failed to come up to the specifications. The deficit for guns which will be completed by June, 1922, is 1,342 rounds. We are asking this year for the manufacture of 360 of those.

Mr. SLEMP. You have more than that. The statement last year, if I remember it, was that you would have about 1,000 by the end of this fiscal year?

Maj. DAVIS. No, sir; I think not. Six hundred and fifty are under manufacture now. We were authorized to purchase out of the war funds 3,950 12-inch, 1,000 14-inch, and 250 16-inch. We already had orders placed for 400 16-inch.

Mr. SLEMP. And you estimate for 350 next year?

Maj. DAVIS. Three hundred and sixty.

Mr. SLEMP. Please put in the record a statement as to the cost of the 8, 10, 12, 14, and 16 inch projectiles.

Maj. DAVIS. Yes, sir.

NOTE.—Cost of armor-piercing projectiles loaded and fuzed, but not including propelling charge: 6-inch, \$56; 8-inch, \$152; 10-inch, \$285; 12-inch, \$509; 14-inch, \$712; 16-inch, \$1,180.

DETAILS OF ESTIMATE.

Mr. SLEMP. In your estimate for next year you are asking \$3,341,786?

Gen. PEIRCE. Of which \$1,502,668 is A, \$769,439 is B, and \$1,569,679 is C. There is a reduction from the original figure of something like \$2,300,000. This is itemized the same as the preceding letters. It contains, however, a number of small items.

Mr. SLEMP. How much are you asking for the continuation of old work under A?

Maj. DAVIS. \$468,000.

Mr. SLEMP. How much for new work under A, experimental and development?

Gen. PEIRCE. One item, \$675,000 is for the manufacture of 16-inch projectiles, loaded, assembled, propelling charges. The original estimate was \$1,967,060 which covered 1290 of these projectiles. That has been reduced to 360.

Mr. SLEMP. And the propelling charges?

Gen. PEIRCE. The A item is \$122,696.

Mr. SLEMP. For what caliber?

Maj. DAVIS. Fourteen-inch and twelve-inch.

Mr. SLEMP. If that were not allowed it would leave your projectiles in what shape?

Gen. PEIRCE. Exactly the same.

Maj. DAVIS. Under the 14-inch propellant charges the deficit is 56 out of a total of 1,632 projectiles, roughly a third, including the cartridge storage cases. In the 12-inch the deficit is 9,942 out of 1,750 or approximately 50 per cent. The deficit in cases there is only 94.

Mr. SLEMP. In the 16-inch it is what?

Maj. DAVIS. We are not asking for any propellant charges for the 16-inch.

Mr. SLEMP. What about No. 15 for the railway mounts—you have not asked for any money for ammunition for the railway mounts?

Maj. DAVIS. None for the projectiles; no, sir.

Mr. SLEMP. Have you a full supply for the accuracy life?

Maj. DAVIS. No, sir; not a full supply for the accuracy life, but we have a sufficient supply so that we do not estimate for any.

GUNS FOR RAILWAY SERVICE.

Mr. SLEMP. How many guns have you in the railway service?

Gen. PEIRCE. Twelve 7-inch Navy railway guns and mounts, forty-seven 8-inch guns and mounts, eighteen 10-inch guns and mounts, ninety-one 12-inch mortars, one 12-inch howitzer, twelve 12-inch guns, limited traverse, three 12-inch guns, sliding mounts, one 14-inch gun and mount, type E, one 16-inch railway howitzer, and thirteen 14-inch Navy railway mounts.

Mr. SLEMP. Where are those guns located?

Maj. DAVIS. Most of the mortars are at Camp Eustis, the Coast Artillery training station. The 10-inch guns, I think, are still at Aberdeen.

Mr. SLEMP. Have you distributed any of these guns with the railway mounts to the various divisions, I mean like the northeast territory, the southern territory, etc.?

Gen. PEIRCE. I do not think so.

Maj. RUHLEN. The distribution has not been made.

Mr. SLEMP. Is the ammunition supply also at Camp Eustis?

Maj. DAVIS. Yes, sir; probably.

Mr. SLEMP. You are not asking for any money for ammunition for railway mount guns?

Maj. DAVIS. Not for projectiles. We are asking for money for assembling the propellant charges.

Mr. SLEMP. Do you regard the 155-millimeter gun as a seacoast railway proposition?

Maj. DAVIS. Some of the 155-millimeter guns have been assigned to the coast defenses for use against land targets.

Mr. SLEMP. How many?

Maj. DAVIS. I can not say, sir.

Mr. SLEMP. They take the place of the old 6-inch gun?

Maj. DAVIS. Supplementing the 6-inch gun.

Mr. SLEMP. Are you putting them on their own mounts or on railway mounts?

Maj. DAVIS. Their own mounts.

Mr. SLEMP. Like we saw this morning?

Maj. DAVIS. I think so.

Mr. SLEMP. Taking the place of the emplacement?

Maj. DAVIS. Yes, sir; it will be a mobile gun.

Mr. SLEMP. You are asking for no ammunition for that?

Maj. DAVIS. No, sir.

Mr. SLEMP. But for the propellant charges in item 15 for the railway mounts?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. How much are you asking for that under "A"?

Gen. PEIRCE. Under "A," \$236,972.

Mr. SLEMP. That is a very large item of your total?

Maj. DAVIS. That item was originally \$550,000, of which \$236,972 is in "A," \$195,767 in "B," and \$117,486 in "C." Part of "C" is in view of the fact that we have since these estimates were prepared gotten definite information that we will receive the 14-inch projectiles from the Navy. The rest of it in "C" is for the 8-inch charges, which is a less important item.

Mr. SLEMP. Is this expectation based on the full accuracy lives of all of these guns in the railway mount service?

Maj. DAVIS. No, sir.

Gen. PEIRCE. It has reference to the number of projectiles on hand and not to the accuracy life.

Mr. SLEMP. Is the number on hand equal in accuracy life?

Maj. DAVIS. No, sir.

Mr. SLEMP. What is the ammunition supply for the railway guns with completed projectiles, ready to fire?

Maj. DAVIS. The 12-inch guns, 1,005 rounds.

Mr. SLEMP. That will be all that you would need for your 12-inch railway mount artillery. How about the 10-inch?

Maj. DAVIS. Seven thousand nine hundred and twenty.

Mr. SLEMP. How many 10-inch guns have you—which one of these guns is it that you are so lacking in ammunition for?

Maj. DAVIS. We lack the entire number of 1,005 charges for the 12-inch railway mount gun. We are asking for 1,005 charges and cartridge storage cases. Of the 12-inch mortar we are lacking the entire number, 10,100 charges and cases. We are asking for 5,050 under "A" and the other 5,050 we will put under "B".

Mr. SLEMP. I thought you regarded that as an obsolete proposition?

Maj. DAVIS. Not the railway mounts. These are railway mounts.

Mr. SLEMP. I understand they are. You have forty-two 14-inch guns which you want to put on railway mounts, which can be fired better than these?

Maj. DAVIS. But they do not give the high angle of firing that these do. These mortars go to 70° .

Mr. SLEMP. You can get 65° with the others?

Maj. DAVIS. But we can not get the short range.

Mr. SLEMP. If you lessen your powder charge, that will give it to you.

Maj. DAVIS. As to the 10-inch, the total deficit there is 7,138 charges and 6,652 cases, of which we are asking for half under "A" and half under "B."

Mr. SLEMP. This railway artillery proposition is not included in the Board of Review project?

Maj. DAVIS. No, sir.

Mr. SLEMP. When did it go in as a part of the seacoast service?

Maj. DAVIS. Allowances for the railway mount guns were included in the revised Board of Review project which I spoke of a moment ago.

Mr. SLEMP. A revision by the War Plans Division?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. The railway artillery is now considered a part of the seacoast defense?

Maj. DAVIS. Yes, sir.

Gen. PEIRCE. Wherever employed, whether for seacoast or land operations, it is to be operated by the Coast Artillery.

INVESTIGATION OF FUSES.

Mr. SLEMP. I notice that you have a lot of money for the investigation of fuses. We have been spending a lot of money under "C"; that is the same class of work?

Maj. DAVIS. No, sir; that is entirely different. It is the point detonating fuse in the nose of the shell, which has, generally speaking, three actions, either a very quick fuse, which is one that bursts before the projectile hits the ground—in other words, it has an extension in front, and when that extension hits the target it detonates.

Mr. SLEMP. Have we not such fuses now?

Maj. DAVIS. No, sir.

Mr. SLEMP. We have plenty of such as we have?

Maj. DAVIS. No, sir; not all of the fuses. We have sufficient so we are not asking for any money to manufacture fuses; that is, sea-coast fuses. A base detonating fuse must be of sufficient strength to stand up against impact on armor plate.

Mr. SLEMP. You have them now?

Maj. DAVIS. Not that will stand up. We have not the fuses. We have projectiles that will negotiate 25° angle impact; we have not the fuse that will negotiate it.

Mr. SLEMP. At what angle will they?

Maj. DAVIS. The normal impact and 10°.

Mr. SLEMP. This is a new thing; a refinement on what you have?

Maj. DAVIS. No, sir; I do not think it is. It is an entirely different fuse.

Gen. PEIRCE. Mr. Slemp, the part of the fuse that carries the secondary detonating element is in a case which projects something like this lead pencil [indicating] inside of the shell and inside of the charge, and when the shell strikes at a considerable angle of impact there is a whip caused in the shell which tends to break or bend this stem, which would not occur at normal impact or at a very slight angle of impact. In other words, a fuse which would satisfy the requirement of normal and 10° impact would not stand up under this higher angle.

Mr. SLEMP. Where are you trying to develop that?

Maj. DAVIS. At Frankford and Picatinny Arsenals. I might say that the first point in the development has been reached, in other words, to get the metal parts of the fuse to stand up under impact. We have that now. The next step in the problem is to get the explosive so that it will stand up.

Mr. SLEMP. Why do you want \$100,000 for the next step?

Maj. DAVIS. It costs approximately \$5,000 to fire one of these fuses through the armor plate. In other words, the cost of the fuse itself is negligible, but in order to try it out you must fire at armor plate, and that costs \$5,000 a round.

Col. RUGGLES. I do not think any country has a satisfactory base detonating armor-piercing fuse. We are the only country, so far as I know, that is even approaching the point of getting one.

Mr. SLEMP. You are not expecting to do very much of this ballistic work this year?

Maj. DAVIS. During the past two years we have gone from 10° up to 25° angular impact and gotten projectiles through.

Mr. SLEMP. You will not work on that next year?

Maj. DAVIS. Yes, sir; we expect to continue that, try to increase the angle of impact.

FOR DEVELOPMENT OF PROPELLANT POWDERS.

Mr. SLEMP. For development of propellant powders, do you want any money? I rather thought that you withdrew most of that, General?

Gen. PEIRCE. That is for the reworking of powder and the completion of the manufacture of pyrocotton. This is for smokeless, flashless, and nonhygroscopic powder.

Maj. DAVIS. We have experiments under way at Picatinny Arsenal, with the Dupont Co., and the Atlas Powder Co. on the development of powder, such powders as smokeless, flashless, and nonhygroscopic. The smokeless and flashless are both self-evident. One produces no smoke and produces no flash either by day or by night, so that it may not be spotted by airplanes or any observation post. The nonhygroscopic feature means it will not absorb moisture from the atmosphere and that is the hardest problem we have now with our present powder. It has got to be hermetically sealed.

Mr. SLEMP. Suppose you managed to work out a satisfactory powder, can you adapt your present plants to the manufacture of the new type?

Maj. DAVIS. Probably not. It is very hard to say yet, because we have not gotten far enough to get to actual manufacturing processes. In other words, it is still a laboratory proposition.

FOR DEVELOPMENT OF HIGH EXPLOSIVES.

Mr. SLEMP. What about the development of high explosives as shell fillers and for boosters, fuses, and primers, and experimental work, etc.

Maj. DAVIS. The "A" item on that is \$40,000. That is the item from which we take money to let contracts with the various universities for experimental research work in explosives. We have contracts now with the Massachusetts Institute of Technology, Cornell, Yale, George Washington, and also some work being done by the Forests Products Laboratory, the Bureau of Mines, and the Bureau of Standards on that work.

INVESTIGATION OF NEW METHODS OF LOADING ARMOR-PIERCING PROJECTILES.

Mr. SLEMP. How about the investigation of new methods of loading armor-piercing projectiles?

Maj. DAVIS. We have had reports of firing this year on armor-piercing projectiles first against plate with no fuses in them where the projectile exploded on the face of the plate instead of going through. In other words, the explosive did not stand up on impact. It was not insensitive enough to stand up, and we have found the reason for that is incorrect loading of the projectile itself. We have just within the past month fired five of the latest type of projectile through caliber armor plate loaded to a much higher density and have gotten no detonation against the plate. That has got to be carried on, however, on plant scale to see whether it is feasible in a plant to get those higher densities. It means a tremendous hydraulic pressure in

order to get them, but if you do not get that your work on armor-piercing projectiles to go through 25 angular impact is all thrown away.

Mr. SLEMP. What about the five thousand 14-inch projectiles that you have and the six or seven hundred 16-inch projectiles. Are they now useless on this account?

Maj. DAVIS. You mean the ones now on hand and in the coast defenses that have been loaded in that way?

Mr. SLEMP. Yes.

Maj. DAVIS. We have not gone far enough to say whether they are all useless or not. We have fired some of them and they have gone off against the plate.

Mr. SLEMP. Where were those shells tested?

Maj. DAVIS. They were never tested after they were loaded. The projectile is accepted on a test of the projectile empty; in other words, as to whether or not the metal of the projectile will stand up when it goes through the plate.

Gen. PEIRCE. I think perhaps I can explain that, Mr. Slemp. These projectiles we have on hand were manufactured under certain specifications and if accepted they passed those specifications satisfactorily.

Mr. SLEMP. But why did you leave out of the specifications such an important matter as the density of the charge?

Gen. PEIRCE. We did not require them to penetrate armor at 25 degrees impact. That is a new development that has only recently arisen.

Mr. SLEMP. The projectiles you have now will penetrate armor at what impact?

Maj. DAVIS. Most of them at normal impact and a few of them at 10 degrees.

Mr. SLEMP. And this is an attempt to so improve the character of the shell that it will penetrate at 25 degrees?

Maj. DAVIS. Yes.

Mr. ANTHONY. Have you got the machinery for putting in the charge under pressure?

Maj. DAVIS. That is installed at Picatinny Arsenal.

Mr. ANTHONY. That is a late development, is it not?

Maj. DAVIS. Yes, sir; that is a brand new development. The plant is just starting to get into production now.

Mr. ANTHONY. Is there any danger of putting too great pressure on the charge?

Maj. DAVIS. The only danger is that you may desensitize it. The harder you press it the harder it is to start the detonation, and if you press it too hard you get what we call a dead press in which you can not detonate.

Mr. ANTHONY. So that is one of the things you have to guard against?

Maj. DAVIS. Yes; you have those two elements. Too low will give you detonation on impact.

Mr. SLEMP. And the purpose of this is to attempt to make the projectile useful at from 10 to 25 degrees?

Maj. DAVIS. Yes, sir.

Gen. PEIRCE. And now that we are getting these projectiles, or expect to get them, that will go through at 25 degrees impact, we

desire to perfect the method of loading those projectiles so that they will, when loaded, go through at 25 degrees.

Mr. SLEMP. You ask for \$225,000 for that purpose; how would you spend that?

Maj. DAVIS. There, again, sir, you get the excessive cost of conducting tests.

Mr. SLEMP. But you have passed beyond the testing stage and have your apparatus ready and it is simply a question of manufacturing activity.

Maj. DAVIS. No; I do not think we have got past the experimental stage. We have fired only five projectiles through a plate without detonation.

Mr. SLEMP. How are you going to use the money?

Maj. DAVIS. That estimate has been changed. The "A" part of that money is \$125,000 and \$100,000 of it has been put under "B."

Col. RUGGLES. This trouble we are now in, Mr. Slemp, and the trouble the Navy and all other people are in is due to not doing enough firing through plates with explosive shells. It costs an awful lot of money to do that. It costs \$5,000 a round and therefore we did this firing with little projectiles, 6-pounders and so on, and we thought that our best explosive; that is, the best we know of, would go through 12 inches of plate with a great big 12 or 14 inch projectile, because we had put it through with 6-pounders.

All of us now, including the Navy and ourselves, find that due to the desire to save money and to save a number of rounds we have made this assumption and we have gone and loaded our projectiles in a way that when we fire them against ships they will detonate on the outside and will not penetrate, and all the expense we have gone to of getting armor-piercing projectiles that will penetrate armor plate of the normal thickness, unless we change our method of loading, is thrown away, and the way we found that out was in the first place through the Battle of Jutland and from our own experiments which we have been able to carry on because we have had more funds as a result of the war. We do not have to throw those projectiles away. We can unload them and then can load them up with explosive properly pressed in.

Mr. SLEMP. What would it cost to load one of these 16-inch shells?

Maj. DAVIS. The cost is approximately \$9 a shell.

Mr. SLEMP. That would be only \$5,000 if you changed all the 16-inch projectiles you have.

Maj. DAVIS. Yes, sir; but the loading cost is a very small percentage of the total cost of the round.

Col. RUGGLES. It is not so serious now that we have discovered it, but this is not the last word. We can not stop with just five shells. We have got to make sure that it is really right and we have other means of making it go through if our plan of higher density does not, and therefore we would be very foolish to leave these shells until we know we have got it right, and so far we have only fired five rounds.

Maj. DAVIS. This \$125,000 figures on 20 projectiles at \$5,000 each against plate and \$20,000 more for experimental loading costs.

DEVELOPMENT AND TEST OF CARTRIDGE STORAGE CASES, ETC.

Mr. SLEMP. Then you have two small items for development and test of cartridge storage cases used for the shipment of propellant

charges and for continuation to probable completion of experiment work in connection with the aliquot type of propelling charge. You ask for \$5,000 under each item. Do you think that is necessary?

Maj. DAVIS. Yes, sir; that is a development we have been working toward for a long time and have just succeeded in developing something that will enable us to very greatly facilitate the supply of powder.

DEVELOPMENT AND RESEARCH WORK IN EXTERIOR BALLISTICS, INCLUDING THE CONSTRUCTION OF RANGE TABLES.

Mr. SLEMP. Next tell us about the development and research work in exterior ballistics, including the construction of range tables.

Maj. DAVIS. "A" is \$85,000 and "B" is \$60,000.

Mr. SLEMP. What does "A" consist of?

Maj. DAVIS. "A" consists of a supply of projectiles more carefully manufactured than the cast-iron target-practice projectile but less carefully manufactured than the armor-piercing projectile.

Mr. SLEMP. What is it for?

Maj. DAVIS. For establishing range tables for these new guns with high angles of fire.

Mr. SLEMP. You mean the 14 and 16 inch guns?

Maj. DAVIS. Yes, sir; and the 12-inch also. The 12-inch now goes up to 30 degrees elevation, and the old range tables actually checked by firing only go up to 15 degrees elevation, so that we are projecting curves pretty far to try to estimate the range tables for elevation from 15 to 30 degrees.

Mr. SLEMP. The range table is a mathematical and not a physical table?

Maj. DAVIS. Yes.

Mr. SLEMP. Is the Navy Department working on these same problems of fuses, primers, and exterior ballistics and shells?

Maj. DAVIS. Yes, sir; we are working very closely with them on it.

Mr. SLEMP. In what way are you working closely with them?

Maj. DAVIS. For instance, they have asked us just within the past couple of months to fire some of their projectiles against plate.

Mr. SLEMP. Do they have a representative at Picatinny Arsenal or Frankford Arsenal?

Maj. DAVIS. Not permanently.

Col. RUGGLES. They have a representative on the board which has control of these matters.

Mr. SLEMP. Have you a representative at any of their producing plants?

Maj. DAVIS. Not permanently.

Mr. SLEMP. Then how can you be working together closely except by occasional correspondence?

Maj. DAVIS. The two officers who control the experimental work and the experimental programs are right here in Washington, and Col. Ruggles is chairman of the Ordnance committee on which the Navy is represented as well as the Army.

Mr. SLEMP. How often do you meet?

Col. RUGGLES. Twice a week throughout the year, and we have a Navy representative on that board, and we keep in touch on that board with our mutual work, and in addition our designing at

manufacturing officers are in constant communication with the Navy, and in passing on all our experiment work we have a naval officer present, and we frequently conduct parts of the same experiment; so we are working in very close touch.

Maj. DAVIS. In this experimental work in connection with the aliquot type of propelling charge we fired half and the Navy fired half, and then we reversed it.

Mr. ANTHONY. Colonel, are you carrying on parallel lines of investigation with the Navy?

Col. RUGGLES. Yes, sir; but we do not duplicate, in that sense. When we have a big experiment we sometimes divide it so they will take part of it and we will take part of it. We have done that.

Mr. SLEMP. For instance, take the fuze proposition.

Col. RUGGLES. The Navy does not design their fuzes. They have been getting their fuzes designed by a man named Semple, as you probably know. We put before Mr. Semple the same problem we are now engaged on of getting a fuze that will go through armor plate with certainty and will detonate the shell inside. Mr. Semple has not been able to solve that problem. He is doing that work for the Navy. In the meanwhile the Navy is simply waiting upon the experiments being conducted by the Army and they are not doing anything, but they know what we are doing. They have arranged to contribute some used armor plate. I want to say in this connection that we do not fire these projectiles through brand new plate. In firing our armor-piercing projectiles through plate, we have to space them a certain distance apart to give a proper test to the shell. That leaves a place in between which is pretty thoroughly resistant and most of our experiments are in using old plates, so that we save a good deal.

If a projectile goes through and the hole is clean, we know that it has had the same resistance as if it had been brand new plate. The Navy are helping in that way, and they help whenever they can. For example, we are using the Navy breechblock entirely for our big guns. We simply took that block over from the Navy. The Navy are experimenting along certain lines of copper fouling and we are not duplicating that, and are being kept informed of what they are doing.

AMMUNITION USED BY THE NAVY.

Mr. ANTHONY. Is there any reason why the ammunition you use and the Navy uses should not be interchangeable?

Col. RUGGLES. There are certain reasons. One particularly big reason now is that we carry a longer windshield on our ammunition, which the Navy can not do because they can not change their ammunition hoists. The result is we get greater ranges than the Navy from the same projectile. The Navy would like to change if they could. That is the only difference between our projectile for our 14-inch and 16-inch guns. We carry a longer windshield and they are prevented from doing that because their ships were laid down before they discovered the need for that. They have a windshield, but not as long as ours.

Mr. ANTHONY. If the necessity arose, could you fire the same ammunition in the 12-inch gun?

Col. RUGGLES. Not in the 12-inch but in the 14-inch and 16-inch we could. The Navy uses a higher velocity gun than we do or they

have been, at any rate, up to the 12-inch caliber, and there was quite a divergence in design between the Army and the Navy until the last year or so, but now our guns are pretty nearly alike and also our projectiles. They have their own opinions, and there is a little difference in the rifling.

Mr. SLEMP. Right on that point, has the Navy any 16-inch guns?

Col. RUGGLES. Yes.

Mr. SLEMP. Have you investigated the projectiles they have?

Col. RUGGLES. The Navy projectile is the same as ours except for the difference in the windshield.

Mr. SLEMP. Suppose our Navy were defeated and we had to rely upon the Army 16-inch guns, we would have an enormous amount of naval 16-inch projectiles.

Col. RUGGLES. We could use those on our guns.

Mr. SLEMP. And the same is true of the 14-inch?

Col. RUGGLES. Yes, sir.

Mr. ANTHONY. What do you mean by the windshield?

Col. RUGGLES. We have two caps on a projectile, one called the ballistic cap; that is to say, a cap which protects the nose of the projectile when it strikes the armor plate, so as to hold it together until it gets a chance to penetrate a certain distance. That has to be of a peculiar shape and offers a great deal of resistance to the air, so that we screw on and notch into the projectile a very long pointed cap which we call the windshield. The result of that cap is that it pierces the air like a streamline body and it reduces the resistance so much that we get 50 or 75 per cent more range. The experiments we have been making since the war have in some cases doubled the range of our projectiles fired from the same gun. That is one of the results of the firing at Aberdeen Proving Ground, Mr. Anthony. We spent a lot of Government money there but it doubled the range of our guns. That information we are able to apply to our shell, but the Navy can not do it because they are tied up with a lot of vessels laid down with ammunition hoists that they can not alter. Just as soon as they can get new ships they will do that.

Mr. ANTHONY. But their guns would fire it?

Col. RUGGLES. Yes. The trouble is they can not bring it up in their ammunition hoists and it complicates their supply at the present time to change over for some of the vessels.

Mr. SLEMP. Considering both the Army and the Navy 12, 14, and 16 inch guns, we are in pretty good shape so far as ammunition is concerned?

Maj. DAVIS. No, sir; I do not think the Army is, so far as 16-inch ammunition is concerned.

Mr. SLEMP. If we got some from the Navy we would be in splendid shape so far as next year is concerned.

Maj. DAVIS. Yes, sir; if we could get it from the Navy.

Mr. ANTHONY. When you talk about whether you have enough ammunition on hand or not, you have to consider how the experts use the term. Before the war, when the preparedness experts used to sound notes of alarm up here, I remember one note they sounded was, "You know we have not enough ammunition for our seacoast guns to last more than an hour of battle." Now, that was perfectly true if you consider that every seacoast gun you had was firing for an hour at the same time. In that event they did not exaggerate, but

the probabilities are that there would not be more than a half a dozen such guns in use at any one time in battle, and you had ammunition enough to fire them probably for a year.

Mr. SLEMP. Yes; and taking the 16-inch gun proposition, you will not have, according to the ordnance statement, six of those 16-inch guns delivered during the next fiscal year. You will have about four.

Maj. DAVIS. Yes, sir.

Col. RUGGLES. I do not think the Navy has any more 16-inch projectiles than they will want and I think we would have trouble getting any from them unless it was ordered by Congress. Their 16-inch gun is a new thing.

Mr. FRENCH. What I had in mind in making the suggestion a little while ago about work being done by the Navy that somewhat parallels this work, we carry in the Navy appropriation bill numerous items and quite large items for various things that you are doing right here. Now, I am not skillful enough to know whether or not the kinds of powder you need and the kinds of shell you need, etc., are the same, so that experimentation work on the part of one will be suitable for the other. For instance, take here under "No. 5," under "H," the experimentation carried on for smokeless, flashless, etc., powder, I know the Navy bill will carry quite a large item there.

Col. RUGGLES. I do not think it is for that particular type of powder.

Mr. FRENCH. I am not sure but it is for a kind of powder that will be able to explode in the daytime without smoke and at night without smoke or light.

Col. RUGGLES. Is the Navy calling for that, too?

Mr. FRENCH. Oh, yes; and there is an item of that kind included in the bill.

Col. RUGGLES. I will say in that connection that it does not do any harm to have two people working on the same problem because it is such a difficult problem. It is just as well to have not only two but several people, provided they interchange their results, because that is an exceedingly difficult problem. The designing of that fuse is a very difficult problem and if you simply put one man on it, he might not have it in him to get that fuse. The only thing is to see if you have six men working on a problem that one man does not work along lines that the other man has tried out and found to be no good, and we are trying to prevent that.

Mr. FRENCH. You indicated a moment ago you were doing very close teamwork and of course that is very essential when work somewhat similar is being done.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION, SUBCALIBER GUNS FOR MOUNTAIN, FIELD, AND SIEGE ARTILLERY PRACTICE (UNITED STATES).

Mr. SLEMP. Unless you have something further to submit, we will pass to the next item.

For purchase, manufacture, and test of ammunition, subcaliber guns, and other accessories for seacoast artillery practice, including the machinery necessary for their manufacture.

You had \$200,000 last year and I think, perhaps, a hangover from some previous appropriation.

Maj. DAVIS. Yes, sir.

Mr. SLEMP. And you are asking this year for \$1,045,000, which I think has been reduced considerably.

Gen. PEIRCE. That has not been reduced materially. The "A" item is \$1,030,000, the "B" item only \$15,000, and "C" none. Most of the items relate to target practice and target practice matériel.

Mr. SLEMP. How does it happen that you want so much more money next year than you had last year? You had quite a hangover, which was supplementary to the \$200,000, did you not?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. How much was that?

Maj. DAVIS. \$1,011,000.

Mr. SLEMP. Then you are spending this fiscal year how much from all sources?

Maj. DAVIS. \$1,200,000.

CURRENT EXPENDITURES.

Mr. SLEMP. How did you spend that?

Maj. DAVIS. Of the 1921 fund; that is this last year, \$30,000 for the manufacture of powder, \$60,000 for the manufacture of primers, \$28,000 for the manufacture of subcaliber ammunition, \$8,000 for small miscellaneous items, \$4,800 for payment of employees, \$800 for transportation; manufacture and repair of seacoast targets, \$25,000, and \$42,700 for the manufacture of 240 millimeter ammunition for issue to the Philippines.

Mr. SLEMP. That accounts for the \$200,000. What became of the \$1,011,000?

Maj. DAVIS. The promises to the committee last year on war and 1920 funds were that we stated we desired to use \$1,015,000. We did actually use \$1,011,773.

Mr. SLEMP. What did you get with that?

Maj. DAVIS. For \$556,000 we got 10,000 3-inch rounds; 1,350 12-inch mortar, 700 pound projectiles; 1,150 12-inch gun, 1,070 pound projectiles; and 1,200 14-inch gun, 1,660 pound projectiles. We also got \$230,000 worth of cartridge storage cases, \$155,000 worth of powder, and \$70,600 worth of transportation, inspection, and other miscellaneous items.

PROJECTILES FOR TARGET PRACTICE.

Mr. SLEMP. Were the projectiles that you produced with that money used for target practice?

Maj. DAVIS. Yes, sir; those are all target-practice projectiles.

Mr. SLEMP. You could not have fired 1,200 of those 14-inch projectiles this year, could you?

Maj. DAVIS. Well, when I said used, I did not mean used; I meant that they were manufactured for target practice, and we are not asking for any of these projectiles this year.

Mr. SLEMP. What about the 12-inch projectiles?

Maj. DAVIS. Of those projectiles, for this year we are asking 650 for the 240-millimeter guns.

Mr. SLEMP. That does not come under this item.

Maj. DAVIS. They are particular guns assigned to the Coast Artillery at Corregidor; that is a special assignment of guns to the Coast Artillery.

Mr. SLEMP. Is this target ammunition standard ammunition which can be used for any purpose except target practice?

Maj. DAVIS. No; this is special target practice ammunition.

Mr. SLEMP. How do those projectiles compare in cost with the large projectiles?

Maj. DAVIS. In this particular case, for the 240-millimeter projectiles, it would be simply a modification of excess stock of high-explosive shells which we have on hand, and will only represent \$5 a shell.

Mr. SLEMP. Is the amount you are asking for next year purely for target-practice work?

Maj. DAVIS. Yes, sir; that is all for target practice.

Gen. PEIRCE. The main item is for manufacturing and reworking smokeless powder.

Mr. SLEMP. Have you not enough powder so that you can get along for another year without asking for \$725,000?

Gen. PEIRCE. But that is a part of the smokeless powder program that I spoke of yesterday and of which you have a full account.

Mr. SLEMP. Let us get at it in another way. How many projectiles do you propose firing next year for target practice? This is for seacoast artillery?

Maj. DAVIS. Yes, sir; 450 rounds of 240-millimeter; 2,100 rounds of 12-inch high-explosive; 240 rounds of 12-inch cast iron; 504 rounds of 14-inch; 1,560 rounds; that is the new weight of projectile.

Mr. SLEMP. Is that all?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. Have you not all of the supply necessary on hand now?

Maj. DAVIS. No, sir.

Mr. ANTHONY. You speak of having manufactured 10,000 rounds of 3-inch last year. Is that the same ammunition that a field gun uses?

Maj. DAVIS. No, sir; the 3-inch field gun is a different gun from what we call the 3-inch 15-pounder seacoast gun. The seacoast gun is a much more powerful weapon.

Mr. ANTHONY. And uses entirely different ammunition?

Maj. DAVIS. Yes, sir; it uses entirely different ammunition. It has a base fuse projectile instead of a point fuse projectile.

Mr. ANTHONY. Why can you not use the same ammunition?

Maj. DAVIS. Well, the base fuse projectile is suitable for attack where the projectile is to penetrate armor of any kind and burst inside, while the point fuse projectile will break up on impact with any particular hard surface; in other words, the point fuse projectile is limited almost entirely to land warfare.

Mr. ANTHONY. So you use the smaller calibers to pierce the armor?

Maj. DAVIS. Of course for piercing only light armor. The 15-pounder is an obsolescent weapon now, but was used for torpedo boats, mine sweepers, and craft of that description.

Mr. SLEMP. You say you do not have those projectiles on hand now?

Maj. DAVIS. No, sir.

however, that if the reserves are to be maintained and available powder reworked, very considerable annual appropriations for this purpose will shortly be necessary.

The Ordnance Department has on hand at the present time between 8,000,000 and 9,000,000 pounds of pyro cotton, which is the material in what might be termed the half-way point in the manufacture of smokeless powder. It is estimated that this pyro cotton has a life of probably five years. It is now 2 or 3 years old.

The powder included in this year's estimates will probably be made from this pyro cotton and not from reworking. Reworking powder consists in crushing the grains and by grinding, reducing them to a powder, which could then, for the smaller sizes, be manufactured into new smokeless powder in the same manner as in the case of the pyro cotton. As previously stated, the important point to be emphasized in this year's "A" estimates of the smokeless powder is the necessity of keeping the skeleton organization at Picatinny Arsenal employed, to prevent the disorganization of this nucleus of trained personnel for such manufacture, and to effect the same result to a limited extent in the plants of commercial concerns such as the Du Pont Powder Co., the Hercules Powder Co., and the Aetna Powder Co. It will therefore be apparent that our "A" estimates for the manufacture of smokeless powder are very modest, and that unless favorable consideration is given to these estimates we may expect all existing smokeless powder organizations to become disorganized and disintegrated and that in the future very great difficulty will be experienced in starting such manufacture again.

ALTERATION AND MAINTENANCE OF SEACOAST ARTILLERY, UNITED STATES.

Mr. SLEMP. The next item is for alteration and maintenance of seacoast artillery, including the purchase and manufacture of machinery, tools, materials necessary for the work, and expenses of civilian mechanics, and you strike out this language:

and extra duty pay of enlisted men engaged thereon.

You had \$1,000,000 for the present fiscal year and you are asking \$1,000,000 for the next fiscal year. State the expenditure of the money under this item during the present fiscal year and what you propose to do next year.

Maj. HARMON. Before starting in, I would like to change the figure of \$1,000,000 for next year to \$725,000.

Mr. SLEMP. That would be "A," then.

Maj. HARMON. That is all "A." Last year the items into which the \$1,000,000 was divided were repair and maintenance of seacoast artillery, about one-half of 1 per cent of the value of the armament; cleaning and preserving material, except for fire-control instruments; spare parts for guns; spare parts for carriages; major alterations; minor alterations of carriages; relining guns; replacement of sub-caliber guns, and, finally, repair and maintenance of spare parts, and cleaning and preserving materials for fire-control instruments. Those do not seem to be very satisfactory subdivisions, and they have been changed this year, but to show the amounts expended under each heading I have retained them for that purpose. Under repair and maintenance of artillery we estimated for \$361,780, and have allotted up to December 31, \$346,164.85.

Mr. SLEMP. What did you repair and maintain with that money?

Maj. HARMON. The organization by which the maintenance is accomplished consists of two parts, one the field organization, which is based on the division of the United States into nine corps areas.

Mr. SLEMP. Is this for the seacoast artillery?

Maj. HARMON. We follow that organization, but some of the corps areas have no seacoast artillery in them, so they are omitted.

Mr. SLEMP. I should not be a bit surprised if the price of powder did not come down to what it would cost you to rework your material.

Gen. PEIRCE. Thirty cents?

Mr. SLEMP. It used to be about 40 cents, did it not?

Gen. PEIRCE. It was around 42 or 43 cents, as I remember. That is the lowest that I recall. Maj. Harris, do you recollect the price of cannon powder?

Maj. HARRIS. During the war, when we had the lowest price ever known, it got down to 42 cents and went as low as 38 cents in the last few days of the war, but before the war we paid 53 cents, and it cost for Government manufacture 50 cents for cannon powder and 60 cents for small-arms powder.

Mr. SLEMP. But your proposition for reworking powder was about 30 cents?

Maj. DAVIS. Yes.

Maj. HARRIS. That is because you save the price of the basic material; that is, the pyro cotton.

Mr. SLEMP. As I say, I think if you will wait a while you will get it down to 20 cents or 15 cents.

Gen. PEIRCE. But we must have something to do in order to keep Picatinny going.

SMOKELESS POWDER.

Mr. SLEMP. That is another point entirely. I think, General, it would be well to put in the record some statement in regard to smokeless powder, just a little monograph on that subject.

Gen. PEIRCE. We can submit the statement of which you already have a copy.

STATEMENT BY BRIG. GEN. W. S. PEIRCE, ASSISTANT CHIEF OF ORDNANCE, ON THE SMOKELESS POWDER RESERVES.

The Ordnance Department has on hand at the present time about 302,000,000 pounds of smokeless powder of which some 28,000,000 pounds is being salvaged. The stocks to be retained are sufficient in bulk weight to meet the requirements, but unfortunately there is a surplus of certain webs of powder and a deficit of others. There is a very material deficit for the smokeless powder requirements of larger caliber seacoast guns. However, in view of the manifest necessity for economy, the "A" estimates for this year only cover the manufacture of approximately 4,000,000 pounds of smokeless powder. It is considered that this amount is necessary to keep a skeleton organization at Picatinny Arsenal engaged in the manufacture of smokeless powder and to enable approximately 2,000,000 pounds to be purchased from commercial concerns, which amount is the smallest that this office believes will interest commercial manufacturers and keep alive a part of their organization in the manufacture of smokeless powder. It is very desirable from a preparedness standpoint to keep the commercial concern interested in this material.

Smokeless powder is estimated to have a life of approximately 15 years. Therefore in the normal course of events before the end of 15 years our reserve must be replaced or else our reserve disappears. The replacement of the reserve could be carried out in any one of several ways. Theoretically, the whole reserve might well be supplied the fifteenth year, but at an enormous expenditure in the one year. On the other hand, one-fifteenth of the reserve could be replaced each year, and one-fifteenth each successive year, but this method would replace powder in the earlier years of the 15-year period which had not probably deteriorated. It is believed practicable to postpone for a year or two the inauguration of the replacement program, as in two or three years the deterioration of smokeless powder will be relatively small. Therefore the program included under the "A" estimates of this year do not really contemplate effecting any part of the replacement program. It should be understood,

Mr. SLEMP. Of the guns?

Maj. HARMON. Yes, sir; and their mounts.

Mr. SLEMP. How much work did you do on the 6-inch, 10-inch, 12-inch, 14-inch, and 16 inch guns last year? Have you divided it in that way?

Maj. HARMON. No, sir; it is not divided in that way.

Mr. SLEMP. All you have here is what has been reported by the various districts as to the amount expended?

Maj. HARMON. Yes, sir; in each of the corps areas concerned there are practically all the calibers of guns, with some exceptions.

Mr. SLEMP. All you have is a report from each of these districts that they have expended so much money in repair work, without stating on what guns they have used the money?

Maj. HARMON. Yes. They maintain an organization of men and machine shops for the repair work, and men may be working in the shop at the same time on a 12-inch gun and on a 14-inch gun, so that it would require quite an elaborate cost system to give you the expenditures on the different guns. The same employees will perhaps be working on a gun, then on a sight, and then on a tractor.

CURRENT EXPENDITURES.

Mr. SLEMP. I wish you would put in the record an itemized statement, as you have it there, as to the manner in which the money was expended this year.

Maj. HARMON. Very well.

NOTE.—The following tabulation shows the amount of funds appropriated under the appropriation "Armanent of fortifications, 1921, M," for the fiscal year ending June 30, 1921, together with expenditures and funds covering obligations up to and including December 31, 1920, and the contemplated expenditures of remaining balances.

Total amount of appropriation.....	\$1,000,000.00
Treasury balance as of Dec. 31, 1920.....	938,098.99

	Estimated last year.	Allotted to Dec. 31.	Contemplated additional allotments.	Balance.
Repair and maintenance of seacoast artillery (about one-half of 1 per cent of total value of the armament).....	\$361,780.00	\$346,164.85	\$56,926.00	.....
Cleaning and preserving material, except for fire-control instruments.....	161,600.00			
Spare parts for guns.....	64,000.00	41,901.00	75,000.00	.....
Spare parts for carriages.....	192,000.00			
Major alterations.....	100,000.00	181,856.00	54,000.00	.....
Minor alterations to carriages.....	12,000.00			
Relining guns and replacement subcaliber guns. Repair and maintenance, spare parts and clean- ing and preserving material for fire-control instruments.....	212,320.00	38,100.00	100,000.00	.....
	93,380.00	33,600.00	10,000.00	.....
Total.....	1,197,080.00	641,621.85	295,926.00	\$62,452.15

Mr. SLEMP. Now, what is your proposition for the coming year?

Maj. HARMON. Class A, \$725,000, and this is divided into item 1. maintenance in the field, \$400,000; repairs at arsenals, \$100,000; modifications in the field, \$50,000; modifications at arsenals, \$75,000; and purchase and manufacture of spare parts and supplies, \$100,000.

MAINTENANCE IN THE FIELD.

Mr. SLEMP. Briefly, give an account of what you mean by each of those items; maintenance in the field, \$400,000, for example.

Maj. HARMON. Maintenance in the field is the money which is expended under the supervision of the corps ordnance officers who are on the staffs of the corps area commanders. This money covers the expenses of their own offices, in which they maintain experts for the various lines of material which they are charged with the responsibility of repairing, and it covers also the mechanics and laborers.

OFFICE EXPENSES, MECHANICS, LABORERS, ETC.

Mr. SLEMP. How much of that goes into office expenses?

Maj. HARMON. The average office force at a corps area is, I should say, four, but some of them have more than that, while others have less; it ranges, probably, from three to six.

Mr. SLEMP. The total cost would be how much?

Maj. HARMON. I can only estimate about \$25,000. We have just the corps areas which have coast artillery in them. Assuming that they have about 20 people in the office altogether, that would be about four apiece.

Mr. SLEMP. Or 24?

Maj. HARMON. About 24, at \$1,200 apiece, which is a low average—

Mr. SLEMP. You probably would not get them at \$1,200 each.

Maj. HARMON. The maximum pay is about from \$1,200 to \$1,400 for clerks and stenographers. The expert mechanics and inspectors are paid more than that. They are considered a part of the field force.

Mr. SLEMP. You have \$35,000 for your office force?

Maj. HARMON. Yes, sir.

Mr. SLEMP. And the rest is taken up by what?

Maj. HARMON. By mechanics and laborers at the various places where matériel is located.

Mr. SLEMP. How many civilian employees do you have under this?

Maj. HARMON. It varies a great deal. I tried to get statements from some of the corps areas. In the First Corps Area they reported, at the time this report was called for, or about the 1st of December, 23; the Second Corps Area reported 19; the Third Corps Area reported 100; the Fourth Corps Area reported from 10 to 75, depending upon conditions; the Eighth Corps Area reported 2, and the Ninth Corps Area reported 17. However, they employ a lot of mechanics and laborers as circumstances require, maintaining always a certain nucleus of specially trained men to supervise the work.

Mr. SLEMP. I can not understand this proposition. If you have the guns constantly in action, with their mounts shocked by the firing, I could understand why you might have to spend a good deal of money in repairing them, but these guns are simply kept there without being used.

Maj. HARMON. There is a good deal of work to be done in taking care of them. To take care of seacoast artillery requires pulling the carriages apart at intervals, and I might remark that this covers a good deal of Coast Artillery matériel which is out of service; that is,

matériel to which no troops are assigned but which the Ordnance Department is required to take care of.

Mr. SLEMP. Where do you keep it?

Maj. HARMON. We keep it where it is, in its location.

Mr. SLEMP. Do you mean that you have to have guards for it?

Maj. HARMON. No, sir; we must have men to take care of it. The caretakers go over the carriages, and it requires almost daily work on a carriage to take care of it. That is because of the exposure at the Coast Artillery forts where the matériel is subject to the action of the salt air. The salt air and wind produce a very rapid rate of deterioration, and that is also aided by blowing sand.

Mr. SLEMP. And by rusting?

Maj. HARMON. Yes, sir; rusting. The salt air causes a great deal of rusting of the iron and steel parts and also corrosion of the brass and bronze parts and deterioration of the electric circuits.

Mr. SLEMP. That would not be taken care of out of this, would it?

Maj. HARMON. Yes, sir. The recuperators have to be taken apart and the sand must be gotten out of the gears.

Mr. SLEMP. What is the total amount that they have requested for next year, or what is the total amount of the requests received from those various corps area commanders, or have they submitted them?

Maj. HARMON. No, sir; we are basing the estimates for next year on the expenditures for this year. As a matter of fact, they are very much reduced below the expenditures for this year.

Mr. SLEMP. What other items can you elucidate?

REPAIRS AT ARSENALS.

Maj. HARMON. For repairs at arsenals, we have \$100,000. That is for the necessary repairs of carriages at the Watertown Arsenal and guns at Watervleit. That also covers any relining we may do, the replacement of subcaliber tubes, and repairs to breech mechanisms.

Mr. SLEMP. Have you any of these in mind that you specifically know to need relining?

Maj. HARMON. There are a number of guns that we were contemplating relining last year, but we passed it over as a matter of economy.

Mr. SLEMP. What caliber guns were they?

Maj. HARMON. Four 10-inch guns, six 12-inch guns, and two 14-inch guns.

Mr. SLEMP. Where are those guns now located?

Maj. HARMON. They are not mounted. I do not know their location. We do not really intend to reline those guns, but, of course, that item would be available for them in case it became necessary. There is no special provision made in this for the relining of any particular guns.

Mr. SLEMP. There is no need for it, so far as you can tell?

Maj. HARMON. No, sir.

Mr. SLEMP. What is the next?

CARRIAGE MODIFICATIONS IN THE FIELD.

Maj. HARMON. The next is "Modifications in the field, \$50,000." That is money that is required to apply to carriage modifications

which have already been undertaken and for which parts are mostly manufactured at the arsenals, or are being manufactured this year, and it will also cover any small modifications which may become necessary next year. About \$40,000 would be required for modifications which are already under way, and about \$10,000 is required for contingencies.

Mr. SLEMP. On what guns are those modifications to be made?

Maj. HARMON. To the 12-inch seacoast carriages. It has particular reference to the electric circuits and antifriction device in the elevating trunnions of the guns, so that the guns can be elevated more easily. At the present time the trunnions rest on the entire trunnion bearing, and the elevation is made difficult; but by placing a small roller bearing under the lower element of the trunnion the gun can be operated more easily.

MODIFICATIONS AT ARSENALS.

The next item is "Modifications at arsenals, \$75,000," which will cover expenses in connection with the manufacture of parts incident to the modifications which will not be completed this year.

Mr. SLEMP. Have most of these artillery posts their own small arsenals where you can make small repairs and modifications?

Maj. HARMON. At each coast defense there is a small machine shop which is equipped with a single machine of each kind, or, say, one lathe, one milling machine, etc.

Mr. SLEMP. Were they enlarged during the war?

Maj. HARMON. They were enlarged somewhat, but not sufficiently to give them any very great capacity. It was just about in accordance with the increase in the equipment.

Mr. SLEMP. In the case of major alterations, such as in breech-blocks, they would go over to the arsenals?

PURCHASE AND MANUFACTURE OF SPARE PARTS AND SUPPLIES.

Maj. HARMON. Yes, sir. For the purchase and manufacture of spare parts and supplies we have an item of \$100,000.

Mr. SLEMP. That is necessary for next year, is it?

Maj. HARMON. Yes, sir.

Mr. SLEMP. Most of your guns are already obsolete in the seacoast defenses, except the 12-inch, 14-inch, and 16-inch guns, and you have some spares for the 12-inch guns now?

Maj. HARMON. Yes, sir; but this covers certain spare parts as required for breech mechanisms and for the guns and carriages as may become necessary, and which may not be on hand, or which would be required to replace stocks on hand.

Mr. SLEMP. You have no request for them, but you estimate on account of your past experience that you may need them?

Maj. HARMON. Yes, sir. It also covers the purchase of oils, greases, paints, etc.

Mr. SLEMP. How much did you spend last year for oil, paint, and grease?

Maj. HARMON. That is another question that I can not answer. In order to keep these items separate at all the various stations and arsenals we would require a very extensive cost-keeping system.

Every work order at the arsenals involves all of these items, and practically every job at the posts involves all these items. That makes it rather difficult to present these maintenance requirements in a manner that is entirely clear to the committee. That is true, because it is practically all required for incidental expenses which can not be predicted.

Mr. SLEMP. In 1915 you got along with \$300,000, and in 1916 you asked for only \$300,000. Since then we have spent a lot of money for this purpose. We spent \$700,000 in 1918, and there was a deficiency of \$3,000,000. You had \$1,250,000 in 1920 for the purpose of trying to get these things in shape. Then you had \$1,000,000 last year for the purpose of trying to get all these repairs, spare parts, etc., put in standard condition. Those expenditures do not seem to have any effect upon the requests for the future.

Maj. HARMON. One reason that item this year is larger than in 1915 is the fact that there is a great deal more material to be considered, and the cost of both material and labor is very much higher. This includes all the railway material which we have acquired, and which is not covered by the item for 1915.

Mr. SLEMP. How much did the commander at Camp Eustis ask you for on that account? He would have most of that material. What did he ask for the the maintenance of his material?

Maj. HARMON. In the Third Corps Area the expenditures made locally have been so far this year, \$66,000. That does not include the expenditures at arsenals which contributed to that station.

Mr. FRENCH. Are the materials for the most part purchased already? Have you purchased the material that you will use this coming year, and do you have it already on hand?

Maj. HARMON. In some cases that is true, but wherever material is used it must be replaced. We can not exhaust our stock of material, and when we have to use a spare part from stock, we must manufacture a new one to replace it.

Mr. FRENCH. A good deal of the expense under this item would be on account of the increased cost of material and labor, or I understood you to say that, and I was wondering whether it would be true that during the coming year there would be a falling off in the cost of labor and also in the cost of material.

Maj. HARMON. There probably will be, and, if so, we will have a balance left at the end of the year that we can return.

Mr. SLEMP. You do not base your estimates upon the value of the material.

Maj. HARMON. No, sir. That did not seem to meet with much favor, and I do not think it is altogether satisfactory myself. What we have tried to do this year is to base the items on the manner in which the money is actually expended.

Mr. SLEMP. That seems to be the better.

Maj. HARMON. We had to make an extended study and try to classify it according to the calibers of the guns, kinds of material, etc., but it became so complicated that we had to give it up. It would mean putting a cost clerk at every station at which the money is expended to keep the time of the men on each job on which they worked.

Mr. SLEMP. What office here in Washington has a check upon the money to be expended for maintenance in the various areas?

Maj. HARMON. The Field Service.

Mr. SLEMP. Do the various local organizations submit to their local commanders reports or requisitions, and are they sent to the Chief of Coast Artillery at Washington for approval?

Maj. HARMON. No, sir; they come directly to the Chief of Ordnance. They are submitted to the Ordnance officers in the various corps areas and are sent directly to the Chief of Ordnance. If the officer at a certain station requires anything done he applies to the corps area Ordnance officer, who either furnishes him the money or applies to the Chief of Ordnance for it after having investigated and found out whether or not it is absolutely necessary that the work be done.

Mr. SLEMP. Is it expected that in the future you will make these estimates in advance so that you can submit the requests from the various commanders to the committee?

Maj. HARMON. Not necessarily, because the Ordnance Office's estimates are very much less than the requests from the field, and they are arrived at more by a study of the expenditures for the past year than they are based on estimates for the areas for the next year.

Mr. SLEMP. It should be arrived at from what the needs are, rather than from the standpoint of experience.

Maj. HARMON. Yes, sir; but the man on the job is much more impressed with the necessity of doing the work in a first-class manner than he is with the necessity for economy.

Mr. SLEMP. What is the total amount of requisitions that you have received from all sources to be expended under this item for the next fiscal year?

Maj. HARMON. We have received no requests for the next fiscal year. They are not made until about the 1st of May.

ALTERATION AND MAINTENANCE OF MOBILE ARTILLERY, UNITED STATES.

Mr. SLEMP. Your next item is, "For alteration and maintenance of the mobile artillery, including the purchase and manufacture of machinery, tools, and materials necessary for the work and the expenses of mechanics engaged thereon." You had for this purpose \$2,000,000 last year, and you are asking for \$2,000,000 for next year.

Maj. HARMON. That figure we would like to change also. We are asking this year, under class A, for \$1,205,000; and under class B, for \$400,000; making a total of \$1,605,000.

Mr. SLEMP. What is your balance?

Maj. HARMON. The amount appropriated last year was \$2,000,000; the Treasury balance on December 31 was \$1,865,623.77; the amount allotted up to December 31, 1920, was \$1,601,470.55, leaving an unallotted balance of \$398,529.45.

Mr. SLEMP. Will you spend all of the rest of that money?

Maj. HARMON. Yes, sir; I think we will, but by so doing we are getting in a position where we can get along with considerably less next year.

CURRENT EXPENDITURES.

Mr. SLEMP. Explain the expenditure of that money for this fiscal year in detail.

Maj. HARMON. For the preservation of serviceable artillery material in storage there has been expended \$613,597.90. For the repair and upkeep of serviceable artillery material in the hands of troops there has been expended \$512,064.90. For the repair and maintenance of tractors in the hands of troops there has been expended \$105,807.75, and for the repair and maintenance of tractors in storage, \$370,000.

Mr. FRENCH. The items that you have just given are for expenditures during the current year?

Maj. HARMON. Yes, sir.

Mr. FRENCH. What are the allotments made between now and the end of the year?

Maj. HARMON. Between now and the end of the year it is expected that there will be allotted for the serviceable artillery matériel in storage \$226,019.75; for the serviceable artillery matériel in the hands of troops, \$35,417.26; for the tractors in the hands of troops, \$62,092.44; and for tractors in storage, \$75,000.

Mr. SLEMP. I am perfectly sure that if there is any history of this business, there must be a radical change in this situation so far as this item is concerned. There is bound to be. In 1912, 1913, and 1914 you asked for only \$25,000 for this purpose and got it. In 1916 you were given \$50,000, and you asked for \$55,000.

Gen. PEIRCE. The amount of artillery matériel that we had in those years was absolutely negligible as compared with what we have now, and that artillery matériel which we have now on hand as the result of the war is one of the most valuable assets we have for preparedness. I think if you could see the figures arrayed in parallel columns they would indicate the reason for the difference in the amount of money necessary for the upkeep. Furthermore, all of those guns that are placed in storage must be kept up. It was necessary to go over all of them as they were received. Many of them were shipped back from France.

Mr. SLEMP. But that has been done once.

Gen. PEIRCE. Yes, sir; it has been done once.

Mr. SLEMP. Then, that should be a complete proposition.

Gen. PEIRCE. I thought you were talking about future expenditures.

Mr. SLEMP. It has been nearly three years, or two years and seven months, since the armistice, and we paid out \$2,000,000 to complete that work. Now, the matter of the maintenance of this artillery divides itself into two parts—that is, the service part and the part in storage. The service part is in the hands of troops, and that is very little, because you expect to equip only one full division. You have skeletonized divisions in these various corps areas. You can not have a great deal of artillery in the service, or many batteries.

Maj. HARMON. We have 35 regiments. We actually have in the service at the present time 35 regiments of field artillery.

NUMBER OF GUNS IN SERVICE.

Mr. SLEMP. How many guns would that be?

Gen. PIERCE. There are 24 guns to the regiment.

Maj. HARMON. There would be 840 guns.

Mr. SLEMP. We have 840 guns with the troops. For that part of your expenditure next year you need how much?

Maj. HARMON. Four hundred and thirty-five thousand dollars; but this covers also 792 guns with Reserve Officers' Training Corps units, making a total of 1,632.

Mr. SLEMP. You estimate that to keep 1,632 guns in good condition you would spend on them \$435,000?

Maj. HARMON. That includes, in addition to the guns, the carriages, limbers, caissons, tractors, the automobile repair trucks, instruments, sights, field glasses, etc.

Mr. SLEMP. How do you arrive at those figures?

Maj. HARMON. The reason why those figures look big is because of the fact that the material is so scattered that we have to maintain a great many organizations in order to take care of it. This includes the Philippines, Hawaii, Panama, and Germany, in addition to continental United States.

Mr. SLEMP. Have you got that subdivided?

Maj. HARMON. We have in a certain way. Under guns, as differentiated from carriages, for repairs at arsenals, we have \$20,000. That will cover any repairs to the gun itself, or to the breech mechanism, and any relining that may be done. It is probable that no relining will be done this year. For preservation of those in storage, we estimate \$30,000.

Mr. SLEMP. You have 1,632 guns in service that are scattered among the Philippines, Hawaii, Panama, Germany, and continental United States for which you state you need about \$400,000. I want to know how you would spend that \$400,000 in taking care of those guns. Those guns are in the charge of troops?

Maj. HARMON. Yes, sir.

Mr. SLEMP. You do not pay for that?

Maj. HARMON. The repair of them is effected by civilian mechanics and not by troops.

The table of divisions which I have here is based on the amount require in each corps area and at the various ordnance establishments under the subdivision of repairs and preservation of material in storage, modification, etc. We allow for the first corps area \$5,000, and that is for the maintenance by the corps area personnel of the material located in the New England States; to the second corps area, \$20,000; to the third corps area, \$30,000; to the fourth corps area, \$60,000; to the fifth corps area, \$30,000; to the sixth corps area, \$30,000; to the seventh corps area, \$30,000; to the eighth corps area, \$60,000; to the ninth corps area, \$65,000; in the Philippines, \$20,000; in Hawaii, \$20,000; in Panama, \$10,000; and in Germany, \$20,000. Included is an item of \$30,000 for the allotment roll. That is used by each of those officers to maintain his organization of inspectors, mechanics, and the laborers who have to assist the mechanics in the work to be done locally. It is very difficult, even in the case of them, to state just how much of that money is spent on a particular gun, carriage, or sight.

Mr. SLEMP. You had so much money on hand and you have written to the various commanders, "We have allotted you this much money"—the affirmative action has come from the Ordnance Department in Washington, rather than having the request for specific repairs, etc., come from the various corps area people to Washington?

Maj. HARMON. That is true for the estimates but not for the allotments. Estimates will be submitted by each of these officers by the 1st of May, in accordance with the regulations of the department.

Mr. SLEMP. Have you the estimates that were submitted to the department last May?

Maj. HARMON. No; I haven't them here, but they are available.

Mr. SLEMP. What changes and alterations, for example, did they ask for last year?

Maj. HARMON. They do not put their estimates on that basis. Taking into consideration the alteration orders which they know are to be accomplished, they estimate for the hire of so many mechanics and so much labor and a provision for the purchase of material, where an emergency requires local purchase.

Mr. SLEMP. Guns of what caliber do you have distributed in these various corps areas?

Maj. HARMON. There are in service with the regular troops 75-millimeter guns, 155-millimeter howitzers, 155-millimeter guns and 8-inch howitzers.

Mr. SLEMP. They are all the guns you have in the present provisional area?

Maj. HARMON. No; they are in addition to those, guns of practically all the mobile calibers distributed to the various stations and particularly to the service schools in order that the personnel may become acquainted with their character; for instance, of the 3-inch, the 240-millimeter, and the 9.2-inch.

Mr. SLEMP. The mechanics there would make such repairs as were necessary for those guns out of their appropriation?

Maj. HARMON. No, sir; they are made by the Ordnance Department under this appropriation, any major repairs. Of course, the organization to which the material is issued is supposed to make such minor repairs as can be done by unskilled personnel. This includes also all the matériel which is located at the Reserve Officers' Training Corps units. This organization also repairs the matériel which is in the hands of the National Guard, although the expense for that is paid from the National Guard appropriation. I might say that the artillery gun equipment to the Reserve Officers' Training Corps is equal to 33 regiments. That matériel, of course, is not in service in the same sense as the matériel in the hands of the regular troops. This covers also all the tractors—all the motorized artillery and tractors in use as utilities, which is a considerable number.

Mr. SLEMP. Yesterday you said, I think, that you had 1,200 with the troops?

Maj. HARMON. Yes, sir; between twelve and thirteen hundred with the troops. A total of 2,500, 5 and 10 tractors altogether in the service.

Mr. SLEMP. What do you estimate will be the amount necessary to keep those in service?

Maj. HARMON. If the tractor is operated with any regularity the estimate is that it will take at least \$400 apiece a year, but if we asked for money on that basis it would be very much more than we have requested here.

Mr. SLEMP. What was the experience on that this present year?

Maj. HARMON. The experience is not altogether satisfactory for the fact that we can not tell how many hours each tractor is actually being operated. Some of them are not in operation at all and others

are operating constantly, but the total expense for the tractors, so far as we have been able to separate it, amounts to \$444,383.75. That is the total expenditure both in the field and in the arsenal including those in storage.

MAINTENANCE OF MATERIAL IN STORAGE.

Mr. SLEMP. Have you the tractor item divided into the cost when in service and when in storage?

Maj. HARMON. Approximately, \$100,000 for the material in service and \$344,000 for that in storage.

Mr. SLEMP. It costs you as much to keep a tractor in storage as to run it?

Maj. HARMON. It will not next year.

Mr. SLEMP. According to that it does. What is your estimate on that item next year?

Maj. HARMON. The estimate for the maintenance of all material in storage next year under class A is \$300,000; that is, all tractors and all artillery and instruments.

DETAILS OF ESTIMATES.

Mr. SLEMP. Will you please put in the record an itemized statement of the expenditure of the \$2,000,000 this year, and give us your idea as to the expenditures under the A item next year, \$1,205,000, and under the B item, \$400,000?

Maj. HARMON. The A item is divided as follows: For maintenance in the field, \$430,000; for repairs in arsenals, \$200,000; for preservation and overhaul of material in store, \$300,000; for modification in the field, \$25,000; for modifications at arsenals, \$50,000; for purchase and manufacture of spare parts, tools, and supplies, \$200,000. The item of maintenance in the field is expended under the supervision of the corps and department ordnance officers, as I explained before, to maintain their organization and to effect repairs on all classes of material under their jurisdiction, including that issued to the regular services and the Reserve Officers' Training Corps unit. Repairs at arsenals, \$200,000, is provided to cover the cost of repairs effected at arsenals on material shipped in from any distant source. It will include the material turned in by the Regular Army, the Reserve Officers' Training Corps units, and the National Guard, and any which may be received from storage at other places, which is not in good condition. For instance, at the present time we are receiving from the Quartermaster Corps a large number of Dodge repair trucks which will probably have to be overhauled before going into permanent storage.

Mr. SLEMP. Do you overhaul automobiles also and charge that to this?

Maj. HARMON. Yes, sir; tractors and automobiles for use in connection with the mobile artillery are charged to this item.

PRESERVATION AND OVERHAUL OF MATERIAL IN STORE.

Mr. SLEMP. How do you arrive at the \$300,000, preservation and overhaul of material in store?

Maj. HARMON. In order that the investment in reserve equipment can be protected and the equipment protected from rapid deterioration it is necessary to conduct a running inspection, followed by such measures, as may be found necessary, of all material in store. The amount of material is so great that a considerable force will be required to go over it all within a period of a year. Some of the material requires more attention and some less attention. A force of approximately 250 men can be employed. With this amount of money it is estimated that they can go over 25 per cent of the material in one year. Thus some of the material will not be touched for a period of four years. There are, approximately, 110,000 vehicles in storage, in addition to the supplies of instruments, accessories, spare parts, and machinery.

Mr. SLEMP. By vehicles you mean caissons, limbers, and tractors?

Maj. HARMON. Yes, sir; that includes everything.

Mr. SLEMP. Everything that runs on wheels?

Maj. HARMON. Yes, sir.

Mr. SLEMP. There can not be any deterioration of a limber or caisson?

Maj. HARMON. Not very much; once they have been put into condition they require very little attention, so that for the first five years, perhaps, there will be nothing required on them. That is why we make this item so small this year, because we contemplate going over only the more important vehicles.

Mr. SLEMP. Take the five or six thousand 75 mm. guns, the most of which you have in storage?

Maj. HARMON. The gun itself requires only attention to the machined surfaces which are not covered with paint, such as the breech base, the breechblock, and the bore. The recuperator is the most difficult part to preserve. We have not been able to find anything that will stand in storage. We are making experiments with various compositions of light oil, recuperator oil, and heavy oil, but the difficulty in all cases is that it is practically impossible to bring the liquid in contact with every portion of the surface.

Mr. SLEMP. What happens if you do not?

Maj. HARMON. It corrodes, and any corrosion of the recuperator is very disastrous to the functioning of the recuperator.

Mr. SLEMP. Can not you hermetically seal it?

Maj. HARMON. It is practically hermetically sealed, but there is air inside, even in the oil. We try to fill them so full with oil that there is no void space left, but there is enough oxygen present to produce deterioration. Of course, in the portions which are thoroughly covered with oil the deterioration is hardly perceptible.

Mr. SLEMP. All you would have to do would be to change the oil once a year, or something like that?

Maj. HARMON. Yes, sir; but that is quite a job on 4,000 recuperators. The expense of the oil is considerable. It is not so much that the oil becomes bad, it may not be necessary to change the oil, but the material must be opened and the spot where the rust has started to occur has to be treated.

Mr. SLEMP. How many did you open and inspect last year?

Maj. HARMON. I do not know.

Mr. SLEMP. Is it not possible that your fears may be groundless?

Maj. HARMON. No, sir. Reports come in to the effect that certain methods of storage are not satisfactory. For instance, at some arsenals they are using liquid oil and at others they are using grease. We are in constant touch with them, trying to arrive at the most satisfactory means. Those who use the oil say that when they open them they find cases of deterioration, even if in storage only a short time. This present year, I should say, however, most of our attention has been addressed directly to material which was put in storage after having been given such treatment as would check deterioration. In the general overhaul program, which we tried to complete this year, the first effort was to check deterioration, and the second to put the material in condition for permanent storage. It was impossible to complete the work of putting all material in condition for indefinite storage, and, so, consequently, the expense this year has been occasioned by taking those secondary measures to prepare the material for indefinite storage.

Mr. SLEMP. On what theory do you contend that a tractor in storage requires as much for maintenance as a tractor in service?

Maj. HARMON. I do not, sir.

Mr. SLEMP. The figures which you have given would indicate that?

Maj. HARMON. Yes, sir; but that is due to the fact that we had to overhaul the tractors and prepare them for storage.

Mr. SLEMP. What do you estimate for next year?

Maj. HARMON. We only estimate \$300,000 for all the material in storage.

Mr. SLEMP. Have you taken any tractor in storage as a unit and determined upon that one unit the cost of its maintenance?

Maj. HARMON. No, sir.

Mr. SLEMP. Can not you do that?

Maj. HARMON. Yes, sir; but the result would be very much greater than the figure asked.

Mr. SLEMP. There might not be anything the matter with it at all and then that amount would be saved?

Maj. HARMON. We know from the character of the machine that it requires attention, that the cylinders of the engine become rusted, and that the engine has to be turned over.

Mr. SLEMP. How often does the engine have to be turned over?

Maj. HARMON. We believe that it should be done once in six months.

Mr. SLEMP. That would not be a very heavy charge?

Maj. HARMON. No, sir.

Mr. SLEMP. Have you explained the other items?

MODIFICATIONS IN THE FIELD.

Maj. HARMON. The next item is modifications in the field, \$25,000. That is a contingent item.

Mr. SLEMP. The repairs at arsenals, that is purely a guess?

Maj. HARMON. Yes, sir.

PURCHASE AND MANUFACTURE OF SPARE PARTS, TOOLS, AND SUPPLIES.

Mr. SLEMP. Purchase and manufacture of spare parts, tools, and supplies, I should say offhand, with the tremendous amount of mate-

rial that we have on hand, you would not have to do anything of that kind?

Maj. HARMON. It is undesirable, Mr. Chairman, to break up the material to get spare parts.

Mr. SLEMP. If you have an excess, it would not be?

Maj. HARMON. We have no excess.

Mr. SLEMP. That depends on what that would mean?

Maj. HARMON. Yes, sir.

Mr. SLEMP. What spare parts do you expect to get next year?

Maj. HARMON. The spare parts for the 75-millimeter gun.

Mr. SLEMP. What kind of parts?

Maj. HARMON. Parts for the breech mechanism of the gun and parts required for the recuperator and elevating and traversing mechanisms.

Mr. SLEMP. That would only apply to the guns in the field?

Maj. HARMON. Yes, sir.

Mr. SLEMP. How many of the 75-millimeter guns are in the service?

Maj. HARMON. We have 512 of the 1917 model—approximately 1,000.

Mr. SLEMP. Is the matter of spare parts a reserve proposition?

Maj. HARMON. No, sir. It is merely to manufacture the parts that are required to maintain a reasonable stock, sufficient to enable the arsenals to fulfill requisitions.

Mr. SLEMP. You mean to say that all the 75-millimeter guns that you have in store now are completed units, without any spare parts of any kind?

Maj. HARMON. That is practically the case. We have some spare parts, but we are not able to fill requisitions. We are actually breaking up gun carriages in order to provide the spare parts needed.

Mr. SLEMP. In 1912, 1913, 1914, 1915, and 1916 you got along with \$40,000 or \$50,000, when you had an Army and had some material and some guns. You are asking now for \$2,000,000. When the storage proposition is eliminated, with the exception of \$300,000, you are asking \$900,000 for the field proposition as against \$45,000 or \$50,000 in those years, which included both those in the field and those in storage—in other words, you are asking for 20 times as much for maintenance and alteration of this mobile artillery than you were able to get along with in 1912, 1913, 1914, 1915, and 1916?

COST OF TRACTORS.

Maj. HARMON. Of course, the tractors would materially increase that cost.

Mr. SLEMP. The tractors are a small item of the \$300,000.

Maj. HARMON. Of the \$300,000 in storage.

Mr. SLEMP. No; outside.

Maj. HARMON. For the total maintenance?

Mr. SLEMP. Yes, sir; spare parts and everything in the service or in the hands of the troops next year you want \$900,000, and you want \$300,000 for storage, as I divide your estimate?

Maj. HARMON. Yes, sir.

Mr. SLEMP. The \$300,000 storage proposition is a small per cent of the total valuation of the material in storage?

Maj. HARMON. Yes, sir.

Mr. SLEMP. And you need 250 men to be constantly at work to overhaul the guns, and the \$900,000 item is what it takes to keep in good condition the material in the hands of troops, which consists of the mechanism of the 1,600 guns and 1,200 tractors. That is bound to be an exaggerated amount if you could find it.

Maj. HARMON. There is one point. The tractors which are in use as utilities we are not counting.

Mr. SLEMP. That would make the total 2,500 tractors for utilities and for service?

Maj. HARMON. Yes, sir. Then, there is quite an assortment of material which is in use at the various service schools. Of course, the maintenance of that is relatively low.

Gen. PEIRCE. Figuring the cost at \$100 apiece, that would be \$250,000, and if you double that it would be \$500,000, and speaking rather feelingly from personal experience, \$200 a year for the repair and maintenance of a pleasure automobile is not a large sum.

Mr. SLEMP. General, you do not consider the use of these tractors in service a daily or hourly service?

Gen. PEIRCE. That is not a continuous service; no.

Mr. SLEMP. You have a little drill and you do that carefully and the expense ought not to be very great.

Gen. PEIRCE. The service of these tractors that are used as utilities, some 1,200 or 1,300 of them, would be much more continuous service.

Mr. SLEMP. That really ought not to be connected with this mobile artillery. You may haul potatoes or chickens or any quartermaster supplies and that ought not to be connected with the upkeep of mobile artillery. I suppose horses would not come under this in connection with the horse-drawn artillery?

Maj. HARMON. Not the horses, but the material they draw. The horse-drawn artillery is included here.

Mr. SLEMP. Does gasoline come under maintenance?

Maj. HARMON. No, sir; the Quartermaster Corps provides for the gasoline.

Col. SMITH. That comes under regular supplies.

Mr. SLEMP. That makes it worse than ever, then.

Gen. PEIRCE. With the computation I gave, you can account for \$500,000 of that \$900,000 on just the item of the tractors alone.

Mr. SLEMP. We ought to get it clearly understood that the tractors, exclusive of the gas they use and the pay of the men, are costing us \$500,000.

Gen. PEIRCE. Well, \$200 would be a better way to look at it, I think. That would be a better comparison.

Mr. SLEMP. That would be \$500,000.

Gen. PEIRCE. On the number in use.

Maj. HARMON. The wear and tear on a tractor is very much greater than on an automobile, because of the character of service it renders.

Mr. SLEMP. General, what suggestion have you to make to get this down on a more economical basis? Is there any way of giving directions for a more economical use of very costly machinery like this?

Gen. PEIRCE. There is no trouble about giving the directions, Mr. SLEMP; the only trouble is having them observed. Our position is that, the material being on hand, if we are directed to issue it for

Army uses we have no option except to issue it, and having issued it we are charged with its maintenance.

Mr. SLEMP. I can understand that; but there is a missing link in there somewhere.

Gen. PEIRCE. The thought which I think you have in mind is whether greater economy in the use of Army material can not be effected.

Mr. SLEMP. Yes.

Gen. PEIRCE. Personally, I quite agree with you.

Mr. SLEMP. You can see that there is something wrong there; in other words, we had better keep the tractors in storage.

Gen. PEIRCE. It is a question of the number of tractors that ought to be in use economically. I do not think that the allowance of \$200 a year for the repair of a tractor is at all large.

Mr. SLEMP. I should think that would be true as to those in use, although I am not so sure about that.

Mr. EAGAN. What is the value of the tractors?

Maj. HARMON. About \$4,500 for the small tractor.

Mr. SLEMP. Ordinary drilling ought not to involve any tremendous strain on the tractor.

Gen. PEIRCE. No; my estimate would be that much the larger part of this repair work would be necessary on the tractors that are used as utilities.

Mr. SLEMP. I am trying to separate that in my own mind from this item.

Gen. PEIRCE. It must also be remembered that these tractors, as we said yesterday, are usable, but they are a rather crude development, and you can all remember that the automobile of 20 years ago required much more in the way of repairs than the automobile of the present day.

Mr. SLEMP. Assuming \$500,000 of this amount is for tractors, that leaves \$400,000 for the mobile-artillery maintenance and spare parts and of that you expect \$200,000 to be for spare parts.

Maj. HARMON. Yes; but that includes also the necessary machine-shop equipment for all the shops that we maintain throughout the country and all the supplies which we have to buy and issue to those shops for the work which they perform.

Mr. SLEMP. Does that mean that you are building up more of these machine shops?

Maj. HARMON. No; but the tool equipment depreciates and certain parts of it have to be replaced every year, particularly the hand tools and the small tool equipment.

Mr. SLEMP. Is that going to mean the maintenance of a large machine shop in each corps area?

Maj. HARMON. No, sir; only the small shops which have always been in the coast defenses but which have been slightly increased recently.

Mr. SLEMP. This has no relation to the coast defense.

Maj. HARMON. That is true. In this case I should include only the small shops at the stations which were constructed during the war and the mobile repair shops which are assigned to the units. Of course, there is also in this the machinery at the arsenals which serve these various corps areas such as Raritan, Augusta, San Antonio, and Benicia.

INCREASED NUMBER OF REGIMENTS OF FIELD ARTILLERY.

Gen. PEIRCE. There were 7 regiments of Field Artillery before the war and now there are 35; also the gun carriages of those regiments are more complicated pieces of mechanism, particularly in regard to the recuperator, than those in use before the war. All of these things would naturally tend to very materially increase the actual care and upkeep of these mechanisms in the service.

Mr. SLEMP. Are these 35 regiments based upon the Army reorganization act of June 5, 1920?

Gen. PEIRCE. I suppose so. There was no precise number of regiments mentioned in that act but the total number of officers and men for field artillery prescribed.

Mr. SLEMP. The statement before the Military Affairs Committee was that we would have one full division, fully equipped, and only one. How many guns would that require that you would have to take care of under this appropriation?

Maj. HARMON. Forty-eight.

Mr. SLEMP. They also propose to have eight skeletonized divisions, one for each corps area. They also propose to have in addition artillery troops at Hawaii and I suppose at Panama.

Maj. HARMON. Yes, sir.

Mr. SLEMP. And do you have mobile artillery in the Philippines?

Gen. PEIRCE. I think so.

Maj. HARMON. I think the Twenty-fourth and Twenty-fifth are being organized in the Philippines and will be motorized.

Mr. SLEMP. And the troops in Germany I should think would be brought back early.

Maj. HARMON. That is just one battalion.

Mr. SLEMP. What is the complement of guns going with a skeletonized division with an army composed of 160,000 men, including the Philippine Scouts and flying cadets, and with the distribution of men in Hawaii, Panama, and the Philippines set out on the basis of an army of 160,000, giving you a skeletonized force for each of these areas of approximately 8,000 enlisted men. That is the bill which passed the House a few days ago. What would be your field artillery in each of those skeletonized divisions?

Gen. PEIRCE. I have no idea, Mr. Slemph. We would not know until that question was worked out by the General Staff and the result promulgated.

Mr. SLEMP. What I want to get is this: For one full division you require 48 guns that you provide the upkeep of under the bill. For eight skeletonized divisions you would not have 8 times as

Maj. HARMON. Probably not. They may skeletonize the regiments, however, and keep the number of guns the same, but I think it would reduce the number of regiments.

Mr. SLEMP. Probably 50 per cent.

Maj. HARMON. Yes, sir.

Mr. FRENCH. Does it not require a certain number of guns to be used in the normal way in practice?

Maj. HARMON. Yes; it does.

Mr. FRENCH. Then, you certainly would cut down the number of guns turned over to a division.

Mr. SLEMP. Assuming the number of guns were cut down in proportion to the number of men on a 50 per cent basis, you would have 192 guns for those 8 skeletonized divisions and 48 for your full division or a total of 240 guns actually in service plus what you have in Hawaii, the Philippines, and Panama, in the way of mobile Artillery.

Maj. HARMON. Yes, sir.

Mr. SLEMP. What would that amount to in the Philippines, Hawaii, and Panama?

Maj. HARMON. In the Philippines at present there is one regiment of 2.95-inch Pack Artillery, and as I say, they propose two regiments of Field Artillery.

Mr. SLEMP. How many guns have they?

Maj. HARMON. That would be 72. That also may be reduced proportionately. In Hawaii there are the Eleventh and Twelfth, both motorized with 48 guns, and at Panama there is one battalion of 2.95-inch Pack Artillery, and in Germany one battalion of 75 mm. horse drawn.

Mr. SLEMP. That would mean about 375 guns that are actually in the service outside of the guns put in the schools and colleges, and those turned over to the National Guard, and you have not turned over many of the National Guard yet?

Maj. HARMON. I have not the figures on that, but that is not a charge against this appropriation.

Mr. SLEMP. Therefore, it seems to me the estimate that you are going to have 1,200 or 1,600 guns in service——

Maj. HARMON. There are certain other guns that ought to be included in that statement. There are six regiments operated by the Coast Artillery at present.

Mr. SLEMP. But that comes in under maintenance?

Maj. HARMON. That is charged to L. It is Mobile Artillery, tractor-drawn.

Mr. SLEMP. What would that be?

Maj. HARMON. It would be Army Artillery. It is of larger calibers, the 8-inch howitzer and 115-mm. gun, and there would also probably be in there the corps Artillery of 155-mm. howitzers motorized which are not assigned to divisions.

Mr. SLEMP. That is in storage?

Maj. HARMON. That is actually in service now by the Field Artillery.

Mr. SLEMP. I believe it would be fairer to put in the record, General, a calculation of the actual number of guns that would be in service based on this proposition of 160,000 enlisted men in the Army next year of one full division, eight skeletonized divisions, and the requirements for Panama, Hawaii, and the Philippines, and ascertain from the head of the National Guard what National Guard units it is proposed to equip with this sort of artillery that we will have to be responsible for the upkeep of, and the same way with the colleges, and then see if this estimate can not be brought down to the requirements of that character. That would make this item correspond to the action of the House recently. Of course, that may be enlarged in

the Senate, but I should not think it would be over 175,000 men, judging from the action in overriding the veto yesterday.

NOTE.—For an army of 280,000 the following artillery would be provided:

	Total.	Reduced ratio.	Plus 10 per cent.
26 regiments, 75-mm. guns, 24 guns each.....	624	389	428
7 regiments, 155 howitzers, 24 guns each.....	168	105	115
Coast Artillery:			
3 regiments, 155 G. P. F., 24 guns each.....	72	45	50
3 regiments, 8-inch howitzers, 24 guns each.....	72	45	50

At the present time no decision has been made by the Chief of Staff as to how the reduction from 280,000 to 175,000 or 160,000 shall be made. If it is assumed that the reduction will be pro rata the office of the Chief of Field Artillery and the office of the Chief of Coast Artillery state that this would be a pro rata reduction in the number of guns in the hands of troops except at the schools and possibly in the foreign possessions. It is estimated that a 10 per cent contingency will cover this item.

Under the above assumptions there will be in the hands of troops in the mobile army, 428 75-millimeter guns or equivalent, 115 155-millimeter howitzers, 50 155-G. P. F., 50 8-inch howitzers.

Gen. PEIRCE. All right, sir; I will have to try to get the basis of that information, however, from the General Staff.

Mr. SLEMP. Is the railway artillery carried under this item?

Maj. HARMON. No; the heavy motorized artillery which is operated by Coast Artillery troops. The railway artillery is carried under M.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION, SUBCALIBER GUNS FOR MOUNTAIN, FIELD, AND SIEGE ARTILLERY PRACTICE, UNITED STATES.

Mr. SLEMP. The next item is:

For purchase, manufacture, and test of ammunition, subcaliber guns and other accessories for mountain, field, and siege artillery practice, including the machinery necessary for their manufacture.

You had an appropriation of \$205,800, and you ask for \$1,050,000 for next year.

Gen. PEIRCE. Of which \$945,000 is A and \$205,000 is C. There is no B. The principal item under this subhead is item 1 for reworking smokeless powder, \$800,000. That is the other part of the powder program about which I spoke a while ago, and the same remarks that I made on the other item apply to this.

Mr. SLEMP. "The manufacture for issue" item, you divide into two parts, new work and repair and maintenance of the targets?

Gen. PEIRCE. Yes.

Mr. SLEMP. The new work is the manufacture of target material and the assembly of ammunition and modifying the 37-millimeter guns. Is target material always destroyed so that you have to get it new practically every year.

Gen. PEIRCE. A great deal of it is. We produced very little of that, of course, during the war.

Mr. SLEMP. What does target material consist of.

Maj. DAVIS. Target material consists of practically the purchase of lumber and hardware and the labor involved in manufacturing the targets themselves.

Gen. PEIRCE. The "A" item under that is \$20,000.

Mr. SLEMP. How much time do you expect to give to this target work next year in number of rounds. Do you expect to do much of that work. I want a general statement of your policy in regard to target practice.

Gen. PEIRCE. The policy, of course, in regard to target practice is established by the War Department and is usually fixed at a certain number of rounds per gun of each caliber, and we take that data and compute the total number of rounds that must be furnished as well as the other material.

Mr. SLEMP. Where does the target practice for these mobile guns usually take place? At Camp Benning or Camp Bragg?

Gen. PEIRCE. That I can not say. They have plenty of ground at Camp Benning, but that is an infantry post.

Mr. SLEMP. It is not necessary to ship these guns in order to get this target practice? You have the guns where you want to fire them?

Gen. PEIRCE. They have ranges in different parts of the country to which troops go for this purpose. Some of those ranges are near posts and others are not. I am not familiar with the exact location of them.

Mr. SLEMP. Is it the purpose to give every entitled man or officer connected with a battery a chance to fire so many rounds from these guns every year?

Gen. PEIRCE.. It is not the mere act of firing the guns, of course, but it is practice in ranging the guns and getting onto targets quickly and measuring ranges; in other words, the sort of preparation in the actual use of the guns that would be valuable in the event of war.

Mr. SLEMP. How much time do they give to that each year?

Gen. PEIRCE. I could not say. I have not that information.

Mr. SLEMP. Item 3 is for assembly of ammunition to cover preparation of service and subcaliber ammunition. Have you not had a lot of that held over? You had \$84,000,000 for that purpose in 1914 and \$10,000,000 in 1918. I believe, however, you stated last year that that money was not used for that purpose; that it was interchanged with other items and the money was used to supply mobile artillery ammunition, is that right?

Maj. DAVIS. Yes, sir; that is correct.

Mr. SLEMP. Have you had any of this practice during this fiscal year?

Maj. DAVIS. Yes, sir; they have had target practice during the past summer.

Mr. SLEMP. Their regular work?

Maj. DAVIS. Yes, sir. The target practice this year, I think, has been below the authorization; that is, for this past year.

Mr. SLEMP. How much did you spend this year on that work? Did you spend all of the amount appropriated last year?

Maj. DAVIS. All but \$5,000 of it will have been spent by the 1st of July and that \$5,000 will have been obligated by then. It will be work that will hold over on some small components.

Mr. SLEMP. What do you expect to get under Item 3 for \$150,000?

Gen. PEIRCE. Of that item only \$60,000 is "A."

Mr. SLEMP. What do you expect to get with that \$60,000?

Maj. DAVIS. That will provide the full allowance in accordance with Special Regulations 32, which is the regulation which lays down the authorized expenditure of ammunition for the Field Artillery.

Mr. SLEMP. And you have no supplies on hand from which you can get that?

Maj. DAVIS. We have of the target practice ammunition, but we have not sufficient supplies of the subcaliber ammunition.

Mr. SLEMP. What about the item for modifying the 37-millimeter infantry guns?

Maj. DAVIS. That is a project which has been undertaken in order to allow us to utilize the large war stocks of 37-millimeter ammunition which remain on hand. The present subcaliber gun for Field Artillery is a 37-millimeter gun, but it is not a gun that can use the war ammunition. So we propose to modify the 37-millimeter gun.

Mr. SLEMP. You just stick them in the other gun?

Maj. DAVIS. Yes; they go right in the other gun. If the bore of the other gun is like this [indicating] the outside will be like this, and there are two ring adapters put in them which slide right into the other gun just as you slide a projectile into a gun and the breech of the little gun is flush with the breech of the big gun.

Mr. SLEMP. Does that give you any test of the larger unit?

Maj. DAVIS. Yes; they use it for training the gun pointers and all the fire-control apparatus and everything of that sort. They give the actual shot, of course, at a reduced range, but they get the explosion and are able to spot and carry out the training.

Mr. SLEMP. And \$50,000 for that purpose is an "A" item?

Maj. DAVIS. \$60,000.

Mr. SLEMP. General, if we did not go into that powder proposition, the total amount next year would be what?

Gen. PEIRCE. On account of cutting out that powder?

Mr. SLEMP. Yes.

Gen. PEIRCE. The powder under "N"?

Mr. SLEMP. Yes; just give me what the "A" items would be.

Gen. PEIRCE. That amounts to \$800,000. It would leave only \$145,000.

Maj. DAVIS. I have submitted a list of the "A" items, itemized, for that appropriation.

CURRENT EXPENDITURES.

Mr. SLEMP. Tell us how you used the \$205,800 appropriated for this year.

Maj. DAVIS. Subcaliber ammunition, \$80,000; for manufacture of powder, \$20,110; manufacture of primers and other small components, \$20,000; for miscellaneous small stores, not directly parts of the ammunition itself, \$18,030; for the manufacture and repair of targets, \$15,000; for the allotment roll of draftsmen, \$5,200; transportation, \$1,000; and for additional allotments for the manufacture of powder, \$20,000; subcaliber ammunition, \$5,000; and repair of targets, \$21,460.

Mr. SLEMP. I presume there are a number of items that you spent money for this year that you are not estimating for next year?

Maj. DAVIS. Yes, sir; that is correct. There was spent during the last year also some war money, authorized by the committee, which was in addition to the appropriation.

Mr. SLEMP. How much was that?

Maj. DAVIS. \$21,557 was actually spent.

Mr. SLEMP. There is no hang-over for next year?

Maj. DAVIS. No.

Mr. SLEMP. Do you not have some items in the Philippines and Hawaii?

Gen. PEIRCE. Yes, sir.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION FOR SEACOAST CANNON, INSULAR POSSESSIONS.

Mr. SLEMP. The next item, then, is for purchase, manufacture, and test of ammunition for seacoast cannon, insular possessions.

Gen. PEIRCE. The "A" item is \$450,932; "B," \$15,000; and "C," \$5,005.

CURRENT EXPENDITURES.

Mr. SLEMP. You had only \$250,000 this last year. How did you expend that and what are your balances?

Maj. DAVIS. To the technical staff at the proving ground, \$3,000; for the completion of the manufacture of 400 14-inch armor-piercing projectiles, \$179,000; transportation, \$2,000; draftsmen's roll, \$6,800; the manufacture of propelling charges, \$45,000; development work on propelling charges, \$14,200, making a total of \$250,000.

Mr. SLEMP. Did you have a war hangover?

Maj. DAVIS. Yes, sir; we did.

Mr. SLEMP. By the way, will the 14-inch projectiles which you have mentioned be delivered during this fiscal year?

Maj. DAVIS. No, sir; there are 800 at Watertown, and we are asking for 360 16-inch and nine hundred and some 12-inch for next year.

Mr. SLEMP. Out of this appropriation?

Maj. DAVIS. Out of this appropriation, yes; and then the 800 that are already provided for at Watertown, which it is expected will hold over and not be completed this year, and which will give Watertown some work on projectiles next year. The statement last year was that we would expend out of war funds and 1919-20 funds, \$2,569,000; out of that we spent only \$498,768, or a surplus of \$2,070,232. That surplus goes to wipe out the deficit under "H," continental United States, to which I called attention a little while ago. Of the \$498,000 that was spent, \$425,000 was for 40 experimental projectiles to develop the higher angle of impact, which was later written into the armor-piercing projectile specifications, and \$73,000 was for propelling charges and the necessary inspection.

Mr. SLEMP. I do not think you made any request for money for purposes of that kind last year.

Maj. DAVIS. You mean on that item for the 40 experimental projectiles?

Mr. SLEMP. Yes.

Maj. DAVIS. I can not recall definitely, sir. The only thing I have here is an extract from those hearings, and it was stated that we would spend \$2,569,000 for the purchase of projectiles; I do not think the hearings stated whether they would be experimental projectiles or production projectiles.

Mr. SLEMP. I never heard of it before. That is \$100,000 for projectiles?

Maj. DAVIS. No; \$10,000.

Mr. SLEMP. There is no hang-over for next year out of war funds?

Maj. DAVIS. No, sir.

Mr. SLEMP. So that you have to rely on the appropriations?

Maj. DAVIS. Yes, sir; they are closed out.

DETAILS OF ESTIMATES.

Mr. SLEMP. You asked for \$474,937. Have you divided that into A, B, and C?

Maj. DAVIS. Yes, sir; item 1, for the manufacture of smokeless powder, \$15,000, has been put in "B"; for the manufacture of 454 12-inch gun projectiles, complete rounds, \$315,872; item "A," for the assembly of propelling charges and procurement of cartridge storage cases, "A," \$70,420; "C," \$5,005; item 4, for loading complete rounds for 240-millimeter howitzer, to be furnished the coast defenses of Manila, under the special project, approved by The Adjutant General, "A," \$53,640; for preparation of 3-inch antiaircraft ammunition, "A," \$15,000; making a total of, "A," \$454,932; "B," \$15,000, and "C," \$5,005, or a total as originally submitted of \$474,937.

240-MILLIMETER HOWITZERS.

Mr. SLEMP. Do you remember how many 240-millimeter howitzers we have?

Maj. DAVIS. I have not the total number on hand.

Mr. SLEMP. How are they to be mounted; do they have their own mounts?

Maj. DAVIS. Yes; they have their own mounts.

Mr. SLEMP. Is that a tractor mount or railway artillery?

Gen. PEIRCE. It is hauled by a tractor; it is not a self-propelled mount.

Mr. SLEMP. That is for the purpose of supplementing the seacoast defenses?

Maj. DAVIS. Yes; it is for land fire.

Gen. PEIRCE. I do not think the tractors will be included. Is that correct, Gen. Coe?

Gen. COE. Only a portion of them.

Mr. SLEMP. When do you expect to deliver those howitzers?

Maj. DAVIS. As I say, I am not sure but what they have already left; I know they have been under order to go for some time, but whether or not they have actually left, I do not know.

Mr. SLEMP. What is the accuracy life of a 240-millimeter howitzer?

Maj. DAVIS. I have not that figure with me.

Mr. SLEMP. You ask for the loading of 6,705 rounds.

Maj. DAVIS. Yes; we ask for the loading of 6,705 complete rounds. The instructions that were received by the Ordnance Department from The Adjutant General of the Army were to issue 12 howitzers and 20,000 rounds of ammunition for them, and we ask for the reduced number of rounds.

Mr. SLEMP. Have we any ammunition with which we could supply these guns?

Maj. DAVIS. We have 10,000 rounds under manufacture now, which are to fill a part of this order.

Mr. SLEMP. Is this all the 240-millimeter howitzer ammunition we have—the 10,000 rounds under manufacture?

Maj. DAVIS. That is all we have in the form of complete rounds: we have empty projectiles and we have powder available, but in the form of completely assembled rounds that is all we have.

Mr. SLEMP. How many incomplete rounds have we?

Maj. DAVIS. Including the 10,000 we have 100,000 empty projectiles; that makes 90,000 in addition to the 10,000.

Mr. SLEMP. That would leave us 4,000 for the 240-millimeter howitzers left in the United States?

Maj. DAVIS. No, sir; there is no provision for the assembly of ammunition for any howitzers left in the United States; the 10,000 that are under manufacture now will go to ———, and what we are asking for next year will go to ——— to partially fill the orders from The Adjutant General for 20,000 rounds.

Mr. SLEMP. Gen. Coe, why did you ask for the 240-millimeter howitzers to be sent to ———, or did you ask for them?

Gen. COE. We concurred in the request, the request having been made by the commanding general, their function being, as stated by Maj. Davis, the defense from land attack.

Mr. SLEMP. That is practically the largest service gun we have that is mobile.

Gen. COE. Tractor drawn and exclusive of the railroad mount.

Mr. SLEMP. You have no railroad facilities there?

Gen. COE. No, sir; that is, there are no railroad facilities on which we can handle railway guns. There is a railroad there, but it runs up a very steep incline.

PREPARATION OF 3-INCH ANTIAIRCRAFT AMMUNITION.

Mr. SLEMP. The next item is for preparation of 3-inch antiaircraft ammunition, \$15,000.

Maj. DAVIS. That is to supply a small amount of 3-inch antiaircraft ammunition to the 3-inch antiaircraft guns mounted in the Philippines. You will remember that I stated this morning there was a large deficit of 3-inch antiaircraft ammunition.

Mr. SLEMP. This is more for practice work than anything else.

Maj. DAVIS. No, sir; this is to start the war reserve.

Mr. SLEMP. We have no antiaircraft guns over there, have we?

Maj. DAVIS. Yes, sir.

MANUFACTURE OF 12-INCH GUN PROJECTILES.

Mr. SLEMP. What about these 454 12-inch projectiles?

Maj. DAVIS. There are 454 12-inch projectiles there and under the Panama Canal there are 495 12-inch projectiles, and these go with

the 360 16-inch projectiles, constituting the total amount of armor-piercing projectiles we are asking for next year. They are asked for not on the basis of deficits at all, but on the minimum quantity of armor-piercing projectiles with which we can interest one outside concern. We have 800 to carry the Watertown Arsenal, which will run over into next year, and then we are asking for 360 16-inch, 495 under Panama, and 454 under the insular possessions. The estimate for armor-piercing projectiles is made on the assumption that we can keep some sort of an organization going at Watertown during the next fiscal year, the 800, and that the remaining nine hundred and some odd would be enough to at least keep one outside concern in the business and keep them interested.

Mr. SLEMP. The Government does not manufacture 12-inch projectiles?

Maj. DAVIS. We have no orders right now, but the Watertown Arsenal has facilitated for them.

Mr. SLEMP. You prefer to have these 12-inch projectiles manufactured outside?

Maj. DAVIS. We contemplate placing them outside simply to insure an organization being kept up on the outside. The three hundred and sixty 16-inch projectiles would not be enough to keep the organization of an outside concern going. There are three concerns from which we generally buy—the Midvale, the Bethlehem, and the Washington Steel & Ordnance. We have asked them the least production on which they can get along and run their plants, and they say five projectiles a day.

Mr. SLEMP. You would not divide those into three parts but would give the contract to one concern?

Maj. DAVIS. Well, that depends on how the bids come in.

Mr. SLEMP. And, as you say, the cost on the outside would be from 10 to 15 per cent lower than if the work were done in a Government arsenal?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. I wish you would restate the totals for those projectiles.

Maj. DAVIS. For 450 12-inch projectiles, under "F. I. P., H," a total of \$315,872; under the Panama Canal, 495 mm. 12-inch projectiles, \$344,810, and under "H," 360 16-inch projectiles, at a cost of \$675,000, or a total of \$1,335,682.

Mr. SLEMP. That is the total suggestion by Ordnance for ammunition, not including the small amount needed for target practice?

Gen. PEIRCE. For armor-piercing projectiles; yes, sir.

ALTERATIONS AND MAINTENANCE OF SEACOAST ARTILLERY IN INSULAR POSSESSIONS.

Mr. SLEMP. The next item is for alteration and maintenance of the seacoast artillery, known as armament of fortifications M, in the insular possessions.

Gen. PEIRCE. We are asking for \$275,000 under "A."

Mr. SLEMP. You had \$125,000 last year.

Gen. PEIRCE. I might say that the increase is evidently covered in item No. 1, which is for special projects covering a war reserve of spare parts as recommended by the commanding general, Philippine Department, and for certain necessary major modifications to rail-

way mounts, \$150,000; the balance, \$125,000, is for the current expenses incident to the maintenance, repair, and alteration of the seacoast artillery.

Mr. SLEMP. There are no railway mounts over there, are there?

Gen. PEIRCE. Well, this language does not necessarily mean that there are railway mounts there.

Maj. HARMON. Those parts are required for general seacoast equipment in the Philippine Islands.

Mr. SLEMP. What are they?

Maj. HARMON. To begin with, I would like to change the total amounts requested. Under class A, it is a total of \$94,000, and under class B, \$150,000, or a total of \$224,000. The class B item is the item for the war reserve.

Mr. EAGAN. You are asking for \$244,000 instead of \$275,000?

Maj. HARMON. Yes, sir. There has been a project prepared by the commanding general of the Philippine Department requesting the supply to the Philippine Islands of a war reserve of spare parts for all the seacoast artillery located in the Philippine Islands. This project has been up for a long time, several years, I believe, but so far no action has been taken. It was finally submitted to the Secretary of War, who directed that \$150,000 be requested this year under class B, upon this project, the total project amounting to about \$300,000. It involves the supplying of such parts as spare breech mechanisms, much more extensive than the parts that we furnish to the stations in the United States, because of the great distance, and the probability that the Philippines would be shut off from the United States in case of hostilities.

Mr. SLEMP. Have you many spare parts there now?

Maj. HARMON. Yes: we have the normal supply which is provided at all seacoast defenses.

Mr. SLEMP. What would a normal supply of spare parts be?

Maj. HARMON. Well, they would be spare parts which are contained in the list issued by the Ordnance Department to accompany each gun and carriage at a station: there are certain parts for the firing mechanism, certain parts for the breech mechanism, and certain parts for the carriages, such as packings for cylinders.

Gen. PEIRCE. Those are the minor parts which wear out and break most frequently in service.

Mr. SLEMP. This means, then, a war reserve?

Maj. HARMON. Yes, sir.

Mr. SLEMP. To provide for any contingency that may arise?

Maj. HARMON. That is the idea.

Mr. SLEMP. The amount you are asking for current expenses incident to the maintenance, repair, and alteration of the seacoast artillery is about three times what you had in prewar times. Is that arrived at by a general guess, or is it based upon experience or specific requests?

Maj. HARMON. It is based on the expenditures during the past year.

Mr. SLEMP. What did you spend there during this past year?

Maj. HARMON. Up to December 31 we have allotted \$117,402.

Mr. SLEMP. Will you spend the rest of the \$125,000?

Maj. HARMON. Yes, sir: it is expected that the balance will be expended.

Mr. SLEMP. That is just for the kind of work you have mentioned for the seacoast defenses in the United States?

Maj. HARMON. Yes, sir. Of course, the necessity exists of maintaining an organization in both the Philippines and Hawaii, due to their distance.

Mr. SLEMP. Does this have relation to Hawaii as well as to the Philippines?

Maj. HARMON. Yes; it covers Hawaii and the Philippines.

Mr. SLEMP. What portion goes to the Philippines and what portion to Hawaii?

Maj. HARMON. About \$58,000 for the Philippines and about \$36,000 for Hawaii.

Mr. SLEMP. Do we have larger facilities in the Philippines?

Maj. HARMON. Yes, sir; we have quite an arsenal in the Philippines—the Manila ordnance depot. It used to be called an arsenal, but the name has been changed, due to the fact that it is under the jurisdiction of the department commander; but it is in effect an arsenal and has in the past done manufacturing work of a certain character.

Mr. SLEMP. You have nothing of that kind in Hawaii?

Maj. HARMON. No, sir; Hawaii is a much smaller station.

Mr. SLEMP. They have to send their guns or parts to be repaired in the United States?

Maj. HARMON. They send them to the United States, except small arms; they do that.

Mr. SLEMP. Is there anything else on that item?

Maj. HARMON. No, sir; that is all.

Mr. SLEMP. Is there any other item under ordnance?

Maj. HARMON. Yes; there is the Panama Canal.

PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION FOR SEACOAST AND LAND-DEFENSE CANNON, PANAMA CANAL.

Mr. SLEMP. The next item is for the purchased, manufacture, and test of ammunition for seacoast and land-defense cannon. You had \$1,000,000 this year. How did you spend that?

Maj. DAVIS. I might state that while we had \$1,000,000 this present year, the "A" estimate is only \$377,610.

Mr. SLEMP. You will put in the record an itemized statement as to the expenditure of the money under these items for this fiscal year?

Maj. DAVIS. I will do so.

Statement of use of 1921 funds under "Panama Canal Fortifications, H."

Loading armor-piercing projectiles	\$20,000
Loading propelling charges	75,000
Manufacture and loading fuses	23,500
Manufacture and loading of fuses to replace those at present in armor-piercing projectiles	263,000
Replacement of fuses in 3-inch and 15-pounder ammunition ..	37,500
For part manufacture of 400 14-inch armor-piercing projectiles ..	260,000
For the assembly of 6-inch propelling charges	45,000
For tests at the proving ground	15,000
Transportation	2,500

Allotment roll for draftsmen-----	\$27, 300
For manufacture of propelling charges, fuses, and armor-piercing projectiles-----	231, 300
Total-----	1, 000, 000

Mr. SLEMP. You did not have any hang-over war funds for that?

Maj. DAVIS. Yes, sir; I think we had.

CURRENT EXPENDITURES.

Mr. SLEMP. You had better give the total amount expended.

Maj. DAVIS. It was stated to the committee that it was desired to spend \$57,750, and of this amount only \$23,207 was expended. We expended a total of \$1,223,207.

Mr. SLEMP. What was it expended for, generally?

Maj. DAVIS. The \$23,000 additional from war funds was for cartridge-storage cases. The \$1,000,000 was expended for loading armor-piercing projectiles which were authorized under war funds, covering 16-inch and 14-inch, and 3,950 12-inch, \$20,000; propelling charges for the projectiles, \$75,000; fuses for those projectiles, \$23,500; fuses for replacements of fuses now in service, \$263,000. There was \$191,000 under "A. F. H." under that item. For replacements of fuses for 3-inch 15-pounders, \$37,500, \$13,650 being under H in that estimate; manufacture of 400 14-inch armor-piercing projectiles, \$260,000, and there was \$55,600 under "H" for that item: securing the assembling of 6,000 6-inch propelling charges to fill special requirements from the Chief of Coast Artillery for rounds to go to Panama, and high-explosive ammunition, and for the technical staff for its proof, \$25,000, and transportation, \$2,500; allotment roll, \$272,000—

Mr. SLEMP (interposing). That is a pretty heavy item, is it not?

Maj. DAVIS. The total allotment roll is authorized as so much money for the Ordnance Department. The total allotment is \$400,000 for the whole Ordnance Department, and there is \$272,000 for Panama Canal "H" that is taken from various appropriations. For the manufacture of propelling charges the amount is \$31,300.

Mr. SLEMP. What are the next year's items? Do you get some of those projectiles next year?

Maj. DAVIS. Yes, sir. The 400 I spoke of are a part of the 8-inch projectiles at Watertown Arsenal, and they are coming along next year.

Mr. SLEMP. You have one 16-inch gun down there?

Maj. DAVIS. We have one 16-inch gun at Panama.

Mr. SLEMP. And no 14-inch guns?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. Are they supplied with projectiles?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. Are they good projectiles?

Maj. DAVIS. They are not the newest projectiles.

Mr. SLEMP. Are they of a good type of the 14-inch gun?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. And you expect to increase the number of rounds by how many?

Maj. DAVIS. We are not asking for anything for the 14-inch guns.

Mr. SLEMP. You have some in process of manufacture.

Maj. DAVIS. A part of the 1,430 are under manufacture now.

Mr. SLEMP. You have one 16-inch gun down there, and you expect to have how many more for that?

Maj. DAVIS. We shall have the full allowance of rounds down there.

Mr. SLEMP. Is that an old type of 16-inch gun?

Maj. DAVIS. Yes, sir. Item 1 is for the manufacture of smokeless powder, and \$5,000 for that has been put under "B;" item 2 is for 425 12-inch projectiles, of armor-piercing type, which is part of the program I spoke of a while ago. That amounts to \$34,000, and I put that under "A." Item No. 3 is for the assembling of propelling-charge program and cartridge-storage cases to overcome deficits, amounting to \$32,800 under "A" and \$6,549 under "C." Item 3 will provide under class A 1,100 14-inch charges.

Mr. SLEMP. That takes in the new projectiles?

Maj. DAVIS. The basic figure of 1,430 projectiles includes all of the projectiles in sight now. That item will also provide 2,500 6-inch charges and cases, which are included at the request of the Chief of Coast Artillery as an item to be given precedence. He wants that item to be given precedence in order to get some ammunition for the 6-inch guns.

Mr. SLEMP. You do not feel that you have any excess of 12-inch ammunition, generally speaking?

Maj. DAVIS. No, sir; of the 12-inch ammunition, we have a large deficit of some 19,000 rounds. I think.

Mr. SLEMP. Which gun do we have at Panama?

Maj. DAVIS. The 1895 model.

Mr. SLEMP. How many 14-inch projectiles have you now at Panama?

Maj. DAVIS. I have not that distribution here. The new distribution of projectiles has just been made, and I will have to supply that.

Mr. SLEMP. Of the 12-inch guns you are manufacturing at Watertown Arsenal, how many are destined for Panama?

Maj. DAVIS. Those are 14-inch.

Mr. SLEMP. No; 12-inch. You are manufacturing some of the 12-inch type in the United States?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. How many are under manufacture?

Maj. DAVIS. Of the 12-inch under manufacture there are about 15 this year.

Mr. SLEMP. Of the 12-inch now under manufacture?

Maj. DAVIS. Yes, sir.

Mr. SLEMP. If we got hard up could we not steal some of those and make up that 495?

Maj. DAVIS. The 495 were put under Panama Canal funds. It is simply a question of the distribution of the funds. The 16-inch were put under Continental United States, and the 12-inch were split two ways, 495 being put under Panama and 454 under the insular possessions. When those projectiles are manufactured the Chief of Coast Artillery indicates what disposition he is going to make of them. Therefore, as to the 495 projectiles manufactured under Panama Canal money, I can not say definitely that they will go to Panama.

Mr. SLEMP. The point really is that you want to keep some men employed?

Maj. DAVIS. On armor-piercing projectiles—that is the whole basis.

Gen. PEIRCE. And to continue the improvement and development.

Maj. DAVIS. We have a shortage of some 19,000 projectiles, and we are asking for 900.

Mr. SLEMP. I should say, considering the condition of the world and the development of the political situation of the world, we would be kept out of any combat in which these projectiles might be used for quite a good while. The purchase of projectiles of this kind, considered in relation to the national security, would be put down at a very small percentage, but for the purpose of keeping your organization going, so as not to forget the art, it would, of course, be put down as more.

Maj. DAVIS. In the last two years we have gone from a 10° to a 25° angular impact, which two years ago would have been considered impossible.

ALTERATION, MAINTENANCE, AND INSTALLATION OF SEACOAST ARTILLERY. PANAMA CANAL.

Mr. SLEMP. The next item is:

For the alteration and maintenance and installation of the seacoast artillery, including the purchase and manufacture of machinery, tools, and materials necessary for the work, and expenses of civilian mechanics.

Gen. PEIRCE. The estimate is \$100,000. That item is of precisely the same character as the preceding one.

CURRENT EXPENDITURES.

Mr. SLEMP. You have a current appropriation of \$104,526. Have you any statement of the expenditures for this fiscal year?

Maj. HARMON. The Treasury balance on December 31 was \$103,651.37; there was allotted to December 31, \$83,800, and it is expected that there will be allotted during the balance of the year \$6,500, leaving a balance to be turned in of \$12,246.40.

Mr. SLEMP. In other words, you got through with a little more than \$90,000 last year.

Maj. HARMON. Yes, sir.

Mr. SLEMP. And your expectation for the coming year—

Maj. HARMON (interposing). This year we are asking for \$75,000 under class A, and an item of \$40,000 under class B, which I will explain in their order. The class A items are divided, \$40,000 for maintenance and \$2,000 for contingent amounts to be expended at arsenals in the United States in case any repairs are necessary.

Mr. SLEMP. How much is that?

Maj. HARMON. \$2,000. \$30,000 is for modifications in the field. That is required to continue the modifications of the 14-inch disappearing carriage so that an elevation of 20 degrees can be obtained, and also to apply the antifriction device to the 12-inch carriage. That is the device which facilitates elevation. For modifications at arsenals, the estimate is \$1,000. That is just a contingent item for any small modifications that may be found necessary. The

next is for the purchase and manufacture of spare parts, tools, and supplies, \$2,000. That is to cover the necessary replacement of facilities during the year. Under class B we have an item for relining the 16-inch gun, for the purchase of the forgings, \$40,000. The 16-inch gun has been fired to date 137 rounds, and the life of it is put at anywhere from 180 to 200 rounds. Therefore, it is expected that a new liner will be required in the not far distant future. It is time to start the work on the forging in order to have it available in the year following. An additional allotment will then be requested for the machining and relining the gun.

Gen. PEIRCE. I think that item had better be put in class C. While I would not wish to give a decisive opinion at the present time, it does seem to me that it is very dubious whether we will want to reline that gun at all, because the gun is of relatively low power.

Mr. SLEMP. It is of the old 16-inch model?

Gen. PEIRCE. Yes, sir. Of 35 calibers, I think it is. It is only fair to say that the relining project includes lengthening the gun in order to get more power, but I am personally rather doubtful as to whether it is advisable. I would rather classify that in C, and then, if the project should receive more favorable consideration, it might be brought up next year.

Mr. SLEMP. I want to ask somebody about what is to be done at Panama. There is a good deal of talk about it. Have you any suggestions to make about that, Gen. Coe, or with reference to strengthening the defenses at Panama?

Gen. COE. There is a letter of the Secretary of War and the General Staff. I do not know whether that has been brought out before this committee, or not.

Mr. SLEMP. It is marked confidential, and we did not have it put in the record.

Gen. COE. I would like to discuss that with the committee when I come before you.

Mr. SLEMP. Let me ask you this question: You do not want any more 12-inch guns or any more 14-inch guns at Panama?

Gen. COE. No, sir.

Mr. SLEMP. Do you want any 14-inch guns on railroad carriages at Panama?

Gen. COE. They are not in any project which has received the approval of the War Department.

Mr. SLEMP. Inasmuch as they do not want any 10-inch, 12-inch, or 14-inch guns, it necessarily comes down to the question of how many more 16-inch guns they want. Are you expecting to send any railroad-mount artillery, or 155-millimeter or 240-millimeter guns, either on their own mounts or on tractors or railroad mounts, for the protection of the Panama Canal?

Gen. COE. No project has yet been approved, or no definite project has as yet been approved for increasing the defenses by the addition of 155-millimeter guns, or any other heavy tractor artillery. Of course, the beach defense there is rather different from the conditions at Oahu or the Philippine Islands. All the beach we control is under the protection of our heavy armament at each end of the canal, and to meet landings which might be made outside of them

would probably be the function of more highly mobile artillery than the 155-millimeter gun. That is, it would probably require the 75-millimeter guns of field artillery type.

Mr. SLEMP. Your proposition, if I understand it, is to keep hostile vessels at such a point that they can not drop projectiles on the locks of the canal.

Gen. COE. That is for the heavy armament, or 16-inch guns. You spoke of 155-millimeter and 240-millimeter guns, but they have not the same function there that they have at Manila or at Honolulu.

Mr. SLEMP. Therefore, they would not be necessary there.

Gen. COE. No, sir. It might be well to put in the record this fact, that Gen. Peirce and I have had quite lengthy talks with regard to the allowance of projectiles, and we think that the present basis of allowance is wrong. We are attempting to formulate a different statement of the problem. If you take the 12-inch gun and say that the requirement is for the full accuracy life of the armament, you would bring the figures to an absurd point. Just how it should be stated we have not agreed upon as yet, but we have that under discussion.

Mr. SLEMP. I suppose you would couple with that a proposition for a special reserve store at some place from which you could send projectiles to some point where you might think they would be needed more than at some other?

Gen. COE. No, sir; I do not think so. I think we have sufficient storage space in our magazines and batteries to accommodate them. If shipments are made, they will have to be made from one part of the country to the other. I think Gen. Peirce and I agree that the present statement of the problem is wrong, and that the allowance for the full accuracy life should be made to apply to armaments like the 16-inch gun. Is that your understanding, General?

Gen. PEIRCE. Yes, sir. The reason for that is that the accuracy life of these large and powerful guns is so much lower that the number of projectiles involved is rather small, and they are very important guns, whereas the exact contrary is true in the case of the 12-inch guns.

Gen. COE. They are becoming obsolete.

Mr. SLEMP. In reference to the 16-inch gun proposition, I would suggest that you coordinate with the Navy so that you could have the use of their projectiles in case of necessity.

Gen. COE. I believe that the 16-inch gun will probably be identical with the Navy's gun.

Mr. SLEMP. You are not going to use the seacoast guns unless the Navy is destroyed or whipped or runs to cover, and then their supply of projectiles could be run into the seacoast guns.

Gen. COE. That depends upon whether the Navy adopts the 16-inch gun.

Mr. SLEMP. They have a lot of them now, have they not?

Gen. COE. No, sir; I do not think they have any. They have none on existing battleships. We have adopted the same breech mechanism.

Gen. PEIRCE. I might offer this suggestion, that the total number of 16-inch projectiles that would be in existence, whether for the Navy or ourselves, would, of course, be subject to the disposition of the President. In the event of such an emergency I should say

that they could be diverted from one to the other, if they were interchangeable. Whether we could in time of peace secure an agreement with the Navy as to that might be another question, but it could be done in an emergency. The President, of course, would have authority to do it.

Mr. SLEMP. Looking at it from the outside, it is an available resource. Suppose we did not give you enough money, and then you could say, "Well, we will fall back on what the Navy has got." Then, it would be important that your mechanisms be the same, and that your rifling, and whatever else is necessary should be the same. On that subject, what use are you making of the 14-inch guns that we are now getting in such large quantities?

Gen. COE. At the present time we are getting only four carriages of any kind for those guns. There is no project beyond four presented to the committee.

Mr. SLEMP. What will you do with the balance of the guns?

Gen. COE. It is my opinion that the railroad carriage will be satisfactory when it is finally completed.

Mr. SLEMP. Suppose there is opposition to that in Congress, or to the spending of any money on them, would you put them in storage?

Gen. COE. Yes, sir.

Mr. SLEMP. You would not advocate emplacing them at all?

Gen. COE. No, sir; I would not, because it would cost as much to emplace them as to put them on railroad carriages, and they are more valuable on railroad carriages.

Mr. SLEMP. You do not anticipate any further need for the 14-inch guns in the field service?

Gen. COE. They will be available for field or any other service upon railway carriages.

Gen. PEIRCE. Mr. Chairman. I should like to add as the last word, in connection with the various estimates for maintenance, that the cost of maintenance performed now as compared with the prewar cost, depends not only on the quantity of material that may be in use, but the fact that wages are very considerably higher. I simply wanted to put that in the record.

Mr. SLEMP. I felt that that was true myself.

FEBRUARY 9, 1921.

HON. C. BASCOM SLEMP,

Chairman House Committee on Appropriations,

House of Representatives, United States.

MY DEAR MR. SLEMP: In accordance with your verbal request, I am submitting herewith a brief description of the basis proposed by the Ordnance Department for the amount of munitions to be retained as a reserve stock for future emergencies. This basis was arrived at after a most careful and exhaustive study of all the elements involved. It may be briefly stated as follows:

The reserve stock of munitions should be sufficient for the initial equipment of all troops that can be raised in an emergency and for the maintenance of that portion of such troops as are actually in the field, until the time at which the new production inaugurated at the declaration of war shall have become equal to all demands of troops.

The conclusion reached from the experience of the World War is that production of munitions in sufficient quantities can not be expected in less than from 12 to 18 months from the declaration of war, depending upon the character of the articles. It is, therefore, evident that the size of the reserve stock must depend upon the number of troops there can be raised within that period and the proportion of such number that will be actually in the field during any part

of this period. The Ordnance Department sees no reason to believe that troops can be raised in the future any more rapidly than they were in the World War. As far as can now be foreseen, exactly the same procedure would have to be gone over again. Congress would have to pass some form of selective service act; registering would have to be made under the act; and cantonments for the housing of troops built, because the temporary buildings of the present cantonments will have disappeared in a short time.

The primary reserve of munitions thus arrived at is a very definite quantity, the annual cost of maintenance of which can be very accurately estimated and presented to Congress each year. The existing stocks on hand, very fortunately, are sufficient in almost all cases for the primary reserve thus computed and, in very many cases, there would remain large surpluses over the requirements of this primary reserve, which surpluses can be disposed of and the cost of their care and maintenance eliminated. The importance of a program of this character can hardly be over-estimated. It presents the problem of the supply of munitions not only in a simple and concrete form but in a form that is absolutely essential for the work of the Ordnance Department. Such a primary reserve would also be one of the two most important elements of national preparedness.

There are two war needs that can not be improvised when war occurs. These are, first, trained officers, and, second, munitions. Troops can be raised and under the pressure of necessity given a reasonable training in a comparatively short time; but neither trained officers nor munitions can possibly be produced within any permissible period of time. If, therefore, a sufficient number of officers be maintained in time of peace, not only to officer the Regular Army that may be maintained but to provide for the instruction of the National Guard and other military training provided for in the act of June 4, last, and this primary reserve of munitions maintained, both the essential elements of reasonable preparedness will have been provided.

Sincerely,

W. S. PEIRCE

Brigadier General, Assistant Chief of Ordnance, United States Army.

TUESDAY, FEBRUARY 8, 1921.

ABERDEEN PROVING GROUNDS.

Gen. PEIRCE. Mr. Chairman, if you have a few moments I should like to have you take up the proving grounds, Army, so that Col. Ruggles may be heard and will not have to come back.

Mr. SLEMP. Certainly.

Col. RUGGLES. Before you take up the estimate, Mr. Chairman, may I say that in 1884 Congress required that there should be appointed a board for testing rifle cannon. That has been going on ever since. It is a perfunctory board now, because we have other organizations making the tests, and we want to have that law repealed. The War Department did not wish to prepare a special bill, but they have no objection and the Chief of Ordnance is favorable. We have an ordnance committee, composed of representatives of all the branches of the line that use the material, and that committee is required to pass on all tests of ordnance, and it serves the purpose of this particular board. The board is absolutely obsolescent and we want to get the law repealed.

Mr. SLEMP. You wish to address yourself to the proving grounds. You have an appropriation for this year of \$350,000 and you are asking \$600,000 for next year?

Col. RUGGLES. The estimate submitted last year was \$900,000.

Mr. SLEMP. \$1,563,670, but that was cut down to \$900,000?

Col. RUGGLES. We cut it down ourselves.

Mr. SLEMP. This year you are asking for \$600,000. If I understand, this is for the Aberdeen proving ground?

Col. RUGGLES. Yes, sir; to cover all tests from .22-caliber to the 16-inch gun, including the test of armor plate, ammunition, and aerial bombs.

Mr. SLEMP. How much are you spending this year?

Col. RUGGLES. At the rate of \$50,000 a month.

Mr. SLEMP. Where are you getting the money?

Col. RUGGLES. \$350,000 under "Proving Grounds, Army," for this year, and there is \$97,669.90 carried over from "Proving Grounds, Army," appropriations of preceding years under the law, and in addition to that there is \$33,377.12 carried over under manufacturing appropriations under the same law. Then we have reserved \$125,000 under manufacturing appropriations. We have not spent that yet.

Mr. SLEMP. Will you expend the \$475,000 by the end of the fiscal year?

Col. RUGGLES. Yes, sir. We are cutting expenses down in every possible way, scrutinizing them all the time. We really can not run at a lesser rate and do the work that is required. We are practically firing at the rate of 16,000 rounds a year. We figure that we ought to fire, to do the work in hand, 48,000 rounds. We estimated last year 75,000 rounds, but of the 75,000 rounds only 28,000 will be required because the material will not be ready for test, including the experimental work in connection with fuses and projectiles.

Mr. SLEMP. You do not pay out of this appropriation the cost of the projectiles that you fire?

Col. RUGGLES. No, sir.

Mr. SLEMP. Simply the service of the ammunition to the guns; that is the only expenditure you have?

Col. RUGGLES. The expense of the proving grounds, such as the railway and motor transportation and boats for protecting the field of fire, and to carry observers to towers, also the making of the butts into which we fire, and maintaining the power house, shops, and other utilities.

Mr. SLEMP. The roads, water, lights, power, and maintenance and repair of buildings and machine shops would be paid out of other appropriations?

Col. RUGGLES. No, sir. All the expenses that relate to the manufacture or experiments are paid out of this appropriation.

Mr. SLEMP. Take the roads, do you pay for them?

Col. RUGGLES. No, sir. The wagon roads are paid for out of the repairs to arsenals. The railroads are entirely paid for out of this appropriation.

Mr. SLEMP. And the repairs to buildings?

Col. RUGGLES. That is paid for out of repairs to arsenals.

Mr. SLEMP. The police force, etc.?

Col. RUGGLES. Two-thirds out of this appropriation.

Mr. SLEMP. How much is spent on that?

Col. RUGGLES. You mean the guards?

Mr. SLEMP. Yes, sir. Is that a substantial item?

Col. RUGGLES. No. We have about 21 or 22 guards and they run about \$1,200—about \$25,000. We are going to do that guard work with soldiers, but that amounts to nothing in the way of saving because the soldiers will be taken from the firing details and we will

have to hire civilians to do the firing. The order has been given that all guard work has to be done by soldiers which makes necessary that swap.

Mr. SLEMP. The machine shop, you do not pay any of that expense?

Col. RUGGLES. Yes, sir; the current repairs to all material under test are chargeable to this appropriation.

Mr. SLEMP. The guns and carriages which are sent there for storage and which you repair, that expense comes out of the other appropriation?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. How much did you spend on the testing feature of that work this fiscal year?

Col. RUGGLES. As to how much money we spent for that, I have not that particular estimate.

Mr. SLEMP. And for the repair of tractors at the proving ground?

Col. RUGGLES. I have not the data.

Mr. SLEMP. Is that substantial?

Col. RUGGLES. No. I can give you the number of machinists. There are 12 machinists who are kept pretty busy in making repairs of that kind; about \$25,000 in all.

Mr. SLEMP. As to these 48,000 projectiles, do you not think that it would be better to take up the testing of the new pilot mounts?

Col. RUGGLES. We expect to test about 28,500 rounds this fiscal year. Of the material which has been finished and delivered under war contracts, we have had to let some of that go because we were so busy with other work.

Mr. SLEMP. If I remember your statement, it was that it was all to be completed before the 1st of July, 1921?

Col. RUGGLES. We thought so, but we did not do it.

Mr. SLEMP. Where does this material come from?

Col. RUGGLES. Most of the material right now is coming from Watervliet Arsenal. Some of it is material delivered by war contractors, and has not been tested. There are 240-millimeter howitzers, 155-millimeter guns, 75-millimeter guns, and 75-millimeter carriages.

Mr. SLEMP. How many of the 240-millimeter guns have you to test next year?

Col. RUGGLES. This year?

Mr. SLEMP. Next year.

Col. RUGGLES. We do not expect to do any of that.

Mr. SLEMP. How about the 155-millimeter guns?

Col. RUGGLES. They are practically completed. There may be a few left over. As a matter of fact, we hope to test this year two hundred and fifty-four 240-millimeter guns, eleven 155-millimeter guns, eighty-eight 4.7-inch guns, seventeen 3-inch antiaircraft guns, 29 carriages, and 54 carriages for the same gun of a different model, 125 trench mortars, and 263 carriages.

Mr. SLEMP. What is your program for next year?

Col. RUGGLES. We have about 48,000 rounds to fire in connection with the pilot mounts.

Mr. SLEMP. You thought last year that the pilot material would be delivered this fiscal year and the tests made?

Col. RUGGLES. We expect to test about 28,000 rounds this year out of the 75,000, a little over one-third, which will be delivered for test this year and two-thirds which we expect next year.

Mr. SLEMP. How do you calculate up to \$600,000?

Col. RUGGLES. That includes about 400 employees who fire, run the railroad, heat, light and power, and other utilities.

Mr. SLEMP. I do not understand that the heat, light, and power come out of this appropriation?

Col. RUGGLES. That comes out of this appropriation for manufacture and experimental purposes and for such buildings as the storage buildings for experimental material.

Mr. SLEMP. Take the residences, barracks, etc.?

Col. RUGGLES. That does not come out of this appropriation.

Mr. SLEMP. You have only one building for manufacturing?

Col. RUGGLES. That building has about 3,000,000 or 4,000,000 cubic feet of space in it.

Mr. SLEMP. That is the one building?

Col. RUGGLES. There are other buildings used for experimental purposes. We are concentrating everything we can in the big building. We have a lot of other shops of temporary construction which we are moving into the machine shop so as to save on heat, light, and power.

Mr. SLEMP. The heat, light, and power for the one building is what you would get out of this appropriation?

Col. RUGGLES. Then there are the requirements for the aviation field buildings for the heavier-than-air machines, for the balloon field, instrument buildings, and buildings used for assembly of ammunition.

Mr. SLEMP. Does all of that come out of this appropriation?

Col. RUGGLES. Yes, sir.

Mr. EAGAN. Are there 350 or 400 civilian employees?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. Have you made the same general classification that Gen. Peirce has made?

Col. RUGGLES. I do not think we can possibly do the work that we have on hand with any less money than that, and therefore have not prepared a similar classification. We always have to look back to Sandy Hook. Sandy Hook had about \$150,000 at a time when the dollar was worth twice what it is now, and that was equivalent to \$300,000, or half that we are asking for. We did not do anywhere near as much work. It costs us a lot of money. We did not know enough about projectiles and fuzes and we did not know how the explosives would work against a ship. The amount of experimental work done at Sandy Hook was so small that we found ourselves in a great deal of ignorance when the war started. A great many things have come up since then.

Mr. SLEMP. Do you not, in this experimental work, duplicate the activities of the Picatinny Arsenal on the fuze matter and some other work of the Bureau of Standards on structural steel, etc.?

Col. RUGGLES. No; because whatever Picatinny Arsenal does in the way of trying to improve the methods of loading projectiles or fuzes, the department can not tell whether they have succeeded until we have actually fired the projectiles and fuzes.

Mr. SLEMP. Your testing is all right, but I am talking about the manufacture.

Col. RUGGLES. We simply fire what they make there.

Mr. SLEMP. You use the term "manufacture" frequently.

Col. RUGGLES. Perhaps the word "experiment" would be better. There is some work that would come under "manufacture," although really maintenance, such as the work done in the overhauling and modifying of carriages incidental to testing.

Mr. SLEMP. You are in earnest about this Aberdeen Proving Ground and we would like very much to accommodate you, but up to 1917 you never asked for more than \$56,200?

Col. RUGGLES. Let me explain that. That was \$56,200 under this appropriation, added to the \$100,000 from the manufacturing appropriations.

Mr. SLEMP. You received according to your statement out of the manufacturing appropriation this fiscal year about \$125,000 reserve, and \$35,000, making \$160,000?

Col. RUGGLES. That is on the basis that we prefer not to use manufacturing appropriations.

Mr. SLEMP. We always feel that if you get in a hard place you can call on Gen. Peirce.

Gen. PEIRCE. This is a very small attempt to secure a better accounting system.

Mr. SLEMP. I think we should have it.

Gen. PEIRCE. What you say is very true. If there is not enough under this appropriation it can, under the language of the act, be eked out of the manufacturing appropriation, but it is thought more desirable to segregate it into one item, so that you will know exactly the amounts that are to be expended for this purpose than to have an indefinite amount under our manufacturing appropriations.

Mr. SLEMP. That may be true, but that we expended so much money at Sandy Hook in times past is a somewhat indefinite guide, and that we spent so much last year in testing, etc., is also not a safe guide. The question before us is the testing activities which ought to be conducted at the Aberdeen Proving Ground, and how much is the testing material going to cost. That is the proposition. All the material you have accumulated in the war period has passed through the process and is in storage and in service. There is a little "hang-over" of pilot mounts and ammunition that ought to be tested. How much of this expenditure, which is more than you are spending on the material itself, is justified in the testing? That is the point that I want to get at.

Col. RUGGLES. As to testing the pilot mounts, it will take \$12,000 for the one type of the 75 millimeters.

Mr. SLEMP. You do not pay for the rounds?

Col. RUGGLES. No, sir; but we have to fire them. Let us see. When we fire, in the first place, we have to bring the ammunition into the proving ground by this railway and have to bring the people onto the proving ground to fire.

Mr. SLEMP. What does the operation of the railway cost?

Col. RUGGLES. I can give that to you.

Mr. SLEMP. That is one of the items?

Col. RUGGLES. Yes, sir. I can figure that. We are now operating two crane crews and a maintenance gang; we have to repair the track during the year and keep it up.

Mr. SLEMP. That is not very large.

Col. RUGGLES. It probably runs \$100,000. We have 35 miles of road.

Mr. SLEMP. You have 35 miles of railroad on the Aberdeen Proving Ground?

Col. RUGGLES. Yes, sir.

Gen. PEIRCE. It is quite a plant.

Col. RUGGLES. It is a tremendously big plant. We have to send observers down the bay to see that it is safe. That requires the employment of men and boats to take them down.

Mr. SLEMP. How many boats?

Col. RUGGLES. Three boats.

Mr. SLEMP. Are you operating them all?

Col. RUGGLES. Yes, sir; they are required for safety purposes. We have two boats, one boat taking the men down to the observation towers and another boat to keep in reserve in case an accident happens. An aviator fell off his plane and drowned because we did not have a boat there in time. Then we must patrol the waters of the bay and must have these observers along the bay to see that the place is safe, and also to watch our shots and see where they fall.

Mr. SLEMP. The observers are officers, are they not?

Col. RUGGLES. No, sir; they are civilians.

Mr. SLEMP. Would you not prefer to have soldiers?

Col. RUGGLES. No; because they have got to observe very carefully.

Mr. SLEMP. I mean, officers would be better?

Col. RUGGLES. Officers could do it, but they would cost more than civilians. We have not enough officers to do that.

Mr. SLEMP. I thought it was the kind of information that officers should have.

Col. RUGGLES. I refer to these men who observe where the shots fall.

Mr. SLEMP. Because when you fight in battles you have soldiers to do that.

Col. RUGGLES. We have men down there who are capable of observing where the shots fall and reporting to the firing point, just as the Coast Artillery uses enlisted men for that purpose.

Mr. FRENCH. Officers do that for the Coast Artillery?

Col. RUGGLES. No; the Seacoast Artillery uses trained enlisted men, while we use civilians who are specially trained. The ordinary soldier would not be skillful enough for that, and to have officers do it would be more costly than to use civilians as we do. It takes about 15 men to load and handle one of these seacoast guns; it takes two or three cranes and a dozen laborers to mount them.

Mr. SLEMP. But you will not have many of those guns to test next year.

Col. RUGGLES. We are doing a lot of testing of these Coast Artillery projectiles and are testing seacoast mounts. We will have a large number of tests going on this year. For example, we have a 16-inch disappearing carriage to test this year; we have powder tests for major caliber guns, firing to compute range tables; we have a number of railway mounts to test and 16-inch howitzer mounts.

Mr. SLEMP. How long does it take you to test a 16-inch howitzer mount, for example?

Col. RUGGLES. I can not say just how long, because it depends a great deal upon the weather. If we can get through a test of that kind in a month we are lucky. The seacoast work does not take up so much of our time as does the other work, but it requires a lot of employees all the time. As a matter of fact, we only have about 60 or 70 people, actually—well, say, from 100 people to 125, including officers, actually doing the firing.

CIVILIAN EMPLOYEES.

Mr. SLEMP. What did you say about the number of the civilian employees?

Col. RUGGLES. We have about 400.

Mr. SLEMP. What is the annual pay roll?

Col. RUGGLES. Well, they average about \$1,000 apiece; that would be a little over \$40,000 a month for the pay roll, which would make \$480,000 a year. That is a pretty fair average—\$1,000—but maybe it averages a little more than that.

Mr. SLEMP. When the Army bill was before the House they went after that pretty strongly.

Col. RUGGLES. About what—the civilians?

Mr. SLEMP. Yes; it seemed to be the desire to substitute officers and soldiers for this work as far as possible, so that I think it will be necessary for you to organize that force on a little different basis.

Col. RUGGLES. We are trying to do the best we can in order to bring about the correct organization. Just think of the number of rounds we fired at Sandy Hook; the maximum number of rounds fired there was 23 rounds a day, or something less than about 7,000 a year, but at Aberdeen we can figure 48,000 rounds for next year, which will be seven times as much as we ever fired at Sandy Hook. The place is a great deal bigger than Sandy Hook, the boats have to go farther, and we have to have these observers on the range.

We are doing seven times as much work and the dollar is worth half what it was. I assure you I have been spending a great part of my time in seeing how we can economize at the proving ground. But you must remember that the buildings are very much bigger and we have more facilities. Sandy Hook was a little bit of a place and was absolutely inadequate for the work, the result being that we did not know anything near enough about our projectiles or guns. We have doubled the range since that time from the same gun, and have made many other developments at Aberdeen. We have discovered that our seacoast shell, as designed before the war, will not go through armor, and detonation inside a ship is very uncertain. The English have discovered the same thing. All of these things we have learned as the result of the war, and now we are trying to correct them. We did not know these things before the war, because we had no money to fire these shells; we did not have plant enough and money enough. Allowing for the present difference between what money will bring now and what it would bring when we had Sandy Hook, we are doing twice what we did at Sandy Hook.

Mr. SLEMP. I do not think that is a logical argument.

Col. RUGGLES. If you have seven times the work and if you are doing seven times the work, have a great deal bigger place to operate, and the dollar is only worth half what it was——

Mr. SLEMP (interposing). I would say, then, that we should not have given you \$56,000.

Col. RUGGLES. That was a ridiculously little sum and that was not anywhere near enough.

Mr. SLEMP. If what you estimate is based on that, then I would say it is too much.

Col. RUGGLES. We do not base it on that.

Mr. SLEMP. I understand you to say that \$480,000 is for the salaries and wages of civilian employees and that \$100,000 will be used to run 35 miles of railroad, to pay for its upkeep and the two crews.

Col. RUGGLES. I would like to make that figure a little more accurate.

Mr. SLEMP. I wish you would. Then you run three boats and, of course, they require fuel, and I believe you said you have three crews the year around. I would like to know how much it costs to run those boats; what their upkeep, repairs, etc., amount to; then I would like to know the number of men you have. I believe you said a few moments ago that you have 12 machinists and that the cost there was about \$25,000—about \$2,000 apiece. Then you have the men who do the actual firing; that is, the loading of the projectiles, pulling the string, etc.

Col. RUGGLES. Loading the projectiles, the clerks, who make up the firing records and keep all the pay rolls, the people who observe the firing, the laborers who fill up the butts, etc. It is a big organization.

Mr. SLEMP. How many enlisted men have you at Aberdeen?

Col. RUGGLES. We have about 117 who are available for duty, while the others are attached to other organizations. As a matter of fact, we only have about 40 enlisted men firing and about 40 civilians firing.

Mr. SLEMP. What are duties of the other 360 civilians?

Col. RUGGLES. I am talking about the men who actually fire the guns. We have observers, repair gangs on the railroad, engineers, we have engineers on the boats, we have clerks, we have storehouse keepers, we have men in the power plant, we have guards, we have people looking after the magazines and refrigerating plant, we have carpenters who build the butts, we have plumbers to keep the mains in condition, and electricians.

Mr. SLEMP. Are the plumbers, electricians, and so on paid out of this appropriation?

Col. RUGGLES. Two-thirds of them are. If plumbing work is done in connection with quarters, it is paid out of repairs of arsenals; but if it is done in connection with firing facilities, it is paid out of this appropriation.

Mr. SLEMP. I believe you were asked to put in some record showing the money received at Aberdeen from all sources.

Col. RUGGLES. I can tell you that.

Mr. SLEMP. How much is it?

Col. RUGGLES. This year, if we get this \$600,000, we will get \$125,000 under ordnance service, but I do not know what we will get under repairs of arsenals; our estimate was \$60,000.

Mr. SLEMP. That comes under the sundry civil bill?

Col. RUGGLES. Yes; but assuming \$40,000, which is about how our proportion will run, it will be about \$760,000. The amount carried under repairs of arsenals must take care of 26 sets of officers' quarters, married, and about 15 sets of bachelor quarters; it must take care of storehouses, and we have a tremendous amount of material stored there; the ordnance service takes care of the overhead that is not directly connected with the experiments, and it is a tremendously big place.

I think it is more economically run than Sandy Hook was run, because, as I say, we do more work; we do more work there for every dollar we spend, and a dollar is not worth what it used to be. The only way I can possibly see to cut down expenses at the Aberdeen Proving Ground is by not testing the guns that Congress has already appropriated for. I do not believe any more care could be given to any place in the matter of trying to reduce the personnel than we have already given.

Mr. SLEMP. You do not spend very much money on the upkeep of the place, the grounds?

Col. RUGGLES. Not any more than to keep the place clean and the weeds down that are dangerous; if weeds grow up to a great extent and you have a fire there it is liable to destroy your buildings.

Mr. SLEMP. You have about 35,000 acres there?

Col. RUGGLES. Yes; we have 30,000 acres in the proving ground itself, and 5,000 acres have been given to the Edgewood Arsenal.

Mr. SLEMP. It is not fenced?

Col. RUGGLES. No. We have a fence around some parts of it. The roads leading into the proving ground are fenced in order to keep people from driving in and not knowing that it is a Government reservation.

Mr. SLEMP. Does this \$760,000 include keeping up the roads?

Col. RUGGLES. Everything.

Mr. SLEMP. That makes no allowance for getting money from any of the manufacturing appropriations?

Col. RUGGLES. No, sir; we are trying to get away from using manufacturing appropriations. Before the war we spent twice as much—and more—of the manufacturing appropriations than we do now. The \$56,000 which we got before the war was wholly inadequate and only carried about one-third of the expenses of the proving ground.

Mr. SLEMP. I had in mind that nearly all of your testing work was over.

Col. RUGGLES. No; we have seven times as much work before us now than we ever had at Sandy Hook. We did not do anywhere near enough at Sandy Hook, and we did so little that we went into the war without a proper knowledge of ordnance. There is no use of making pilot mounts unless you test them to find out whether they work, and there is no use of ordering tractors unless you give them exhaustive tests.

Mr. SLEMP. Do you test tractors there?

Col. RUGGLES. Yes, sir; and tanks; we test airplane bombs and all aircraft armament; we test small-arms ammunition and all new bullets; we test everything that ordnance makes; everything has to be tested there.

Mr. EAGAN. Ammunition, too?

Col. RUGGLES. Yes; small-arms ammunition, big-gun ammunition; everything from the .30 caliber, or smaller, in case we make it, to the 16-inch gun. It all has to be tested at the proving ground before it can be determined whether it is proper ammunition.

Mr. SLEMP. How many of your 400 civilian employees are skilled mechanics?

Col. RUGGLES. I will have to count them up, because I do not have them listed that way. I have them divided up into the people who are directly connected with the firing and those people who are working with the loading, etc. For example, in the test of guns we have four proof directors; they are civilians and they oversee the firing, because we do not have enough officers.

Mr. SLEMP. What do you pay them?

Col. RUGGLES. We pay them \$2,100 a year.

Mr. SLEMP. Do you give them quarters in addition?

Col. RUGGLES. No. Then we have foremen, laborers, and computers. A computer is one who takes the ranges and corrects them for wind.

Mr. SLEMP. What do they get?

Col. RUGGLES. They get \$2,000; we have chief range observers who get \$2,000 and other range observers who get \$1,500; we have photographers, because we have to make photographs of these experiments and submit them with our reports. Then we have chronograph operators who run the instruments that take the velocity of the projectiles; then we have crane operators; we have about six of those running our heavy cranes. I can give you an outline of all we have, if you want it.

Mr. SLEMP. I think it would be a very good idea to do it.

Col. RUGGLES. Just the different types of employees?

Mr. SLEMP. Yes.

Mr. EAGAN. The number and their salaries.

Col. RUGGLES. Very well.

NOTE.—List A is a recapitulation of estimate for labor and material for fiscal year 1922, and the sheets attached thereto show in detail how the funds for labor expect to be used. List B shows the personnel of the proving ground as of February 1, 1920, paid from the appropriation "Proving ground, Army. Ordnance service and repairs of arsenals." Under "Proving grounds, Army," of this list is included all employees, the salary of which is properly chargeable against this appropriation, but on account of insufficient funds their salaries toward the end of the fiscal year must be borne by applicable manufacturing appropriations.

LIST A.

ARMY PROVING GROUNDS, 1922—DETAILED ESTIMATE SHOWING MATERIAL AND LABOR. *Recapitulation.*

Labor	\$419, 075. 07
Material	180, 924. 93
Total	600, 000. 00
Employees covered in this estimate for 1922	291

Estimate for fiscal year 1922.

Sub-head No.—		Labor.	Materials.
1	Test of mobile guns, carriages, ammunition, and accessories.....	\$53,207.90	\$5,220.00
2	Test of seacoast guns, carriages, and accessories.....	22,338.80	4,000.00
3	Test of railway guns, carriages, and accessories.....	18,627.29	9,000.00
4	Test of seacoast ammunition.....	25,776.25	6,500.00
5	Test of bombs, bomb devices, grenades and accessories, and aerial devices.....	24,384.72	8,607.51
6	Test of small arms, automatic rifles, or other automatic or semiautomatic guns and accessories.....	3,697.32	.....
7	Test of ammunition for small arms and machine rifles.....	8,627.05	.....
	Transportation:		
8	Animal.....	4,969.00	2,361.71
9	Motor.....	14,796.60	7,230.00
10	Rail.....	35,987.44	18,360.59
11	Maintenance and operation of proving-ground patrol boats.....	6,180.00	4,094.50
12	Power, heat, and light for buildings used in connection with testing and experimental work.....	19,993.50	98,718.62
13	Maintenance of water supply.....	3,285.00	750.00
14	Telephone service in connection with testing and experimental work ¹	5,265.00	6,735.00
15	Operation and maintenance of high-explosive and constant-temperature magazine and ammunition assembly plants (not including cost of power).....	15,600.00	5,400.00
16	Engineering section.....	11,852.00	.....
17	Firemen and guards.....	15,000.00	.....
18	Shops.....	85,867.20	4,024.00
19	Services of employees engaged in the preparation and maintenance of firing records, experimental reports, financial records, etc.....	43,620.00	.....
	Total.....	419,075.07	180,924.93

¹ Rental.*Proving grounds, Army—Estimated needs, Aberdeen Proving Grounds, Md., for fiscal year 1922,*

		Expended fiscal year 1920. (Money allotted under other subheads.)	Estimated, fiscal year 1922
1.	Test of mobile guns, carriages, ammunition, and accessories.....	.....	\$58,457.90
	1 proof director.....	\$2,100.00	
	Do.....	2,000.00	
	1 foreman.....	1,800.00	
	14 laborers, at \$1,246.85.....	17,707.90	
	2 computers, ¹ at \$2,000.....	4,000.00	
	1 chief range observer ¹	2,000.00	
	4 range observers, ¹ at \$1,500.....	6,000.00	
	2 photographers, ¹ at \$1,600.....	3,200.00	
	1 clerk (record and erosion curves) ¹	1,300.00	
	4 star gauges, ¹ at \$1,500.....	6,000.00	
	3 chronograph operators, ¹ at \$1,700.....	5,100.00	
	1 recorder.....	2,000.00	
	Lumber for bursting screens.....	2,400.00	
	Photographic supplies.....	2,000.00	
	Screen wire.....	500.00	
	Screen frames.....	350.00	
	Total.....	58,457.90	
2.	Test of seacoast guns, carriages, and accessories.....	.....	26,338.80
	1 proof director.....	\$2,100.00	
	1 foreman.....	2,700.00	
	Do.....	2,400.00	
	1 crane operator, at \$6.16 per diem.....	1,928.00	
	11 laborers, at \$1,200.98.....	13,210.80	
	Tools (machine shop).....	500.00	
	Bolts, washers, clamps, etc., for butts.....	1,500.00	
	Lumber for butts.....	2,000.00	
	Total.....	26,338.80	

¹ These employees, while charged under this subhead, are used and needed in connection with all tests performed under subheads 1 to 7, inclusive.

*Proving grounds, Army—Estimated needs, Aberdeen Proving Grounds, Md., for
fiscal year 1922—Continued.*

		Expended fiscal year 1920. (Money allotted under other subheads.)	Estimate, fiscal year 1922.
3. Test of railway guns, carriages, and accessories.....			\$27,627.29
1 proof director.....	\$2,000.00		
1 foreman.....	2,400.00		
1 crane operator, at \$6.16 per day.....	1,928.00		
1 fireman.....	1,339.64		
9 laborers, at \$1,217.74.....	10,959.65		
Tools (machine shop).....	500.00		
Bolts, washers, clamps, etc., for butts.....	1,500.00		
Lumber for butts.....	2,000.00		
Railway material.....	5,000.00		
Total.....	27,627.29		
4. Test of seacoast ammunition.....			32,276.25
2 foremen, at \$200 per month.....	\$4,800.00		
3 crane operators, at \$6.16 per day.....	5,784.00		
2 firemen, at \$4.28 per day.....	2,679.28		
11 laborers, at \$1,137.54.....	12,512.97		
Tools (machine shop).....	500.00		
Bolts, washers, clamps, etc., for butts.....	2,000.00		
Lumber for butts.....	4,000.00		
Total.....	32,276.25		
5. Test of bombs, bomb devices, grenades and accessories, and aerial devices.....			32,992.23
Bomb section:			
2 proof assistants, at \$2,000.....	\$4,000.00		
2 foremen, at \$1,600.....	3,200.00		
12 laborers, at \$1,132.06.....	13,584.72		
Material.....	5,807.51		
		\$26,592.23	
Trench warfare section (firing detail—enlisted men):			
Laying off ranges and repairing range stakes.....	800.00		
3 laborers (full time).....	3,600.00		
Material.....	2,000.00		
		6,400.00	
Total.....		32,992.23	
6. Test of small arms, automatic rifles, and other automatic or semiautomatic guns and accessories.....			3,697.32
1 proof director (part time), at \$2,100.....	\$1,050.00		
3 laborers, at \$4 per diem.....	2,647.32		
	3,697.32		
7. Test of ammunition for small arms and machine rifles.....			8,627.05
1 proof director (part time), at \$2,100.....	\$1,115.05		
6 laborers, at \$4 per diem.....	7,512.00		
	8,627.05		
8. Transportation (animal).....			7,233.71
1 foreman.....	\$1,800.00		
1 horseshoer, at \$6 per diem.....	1,878.00		
5 teamsters, at \$4 per diem.....	6,260.00		
Forage for 10 animals:			
Oats, 51,100 pounds, at \$4.80 per hundredweight.....	2,452.80		
Hay, 62,050 pounds, at \$3 per hundredweight.....	1,861.50		
Straw, 12,167 pounds, at \$1.60 per hundredweight.....	194.68		
Salt, 183 pounds, at \$0.03 per pound.....	5.50		
Vinegar, 11½ pounds, at \$1.30 per gallon.....	14.95		
	14,467.43		
50 per cent ordnance service subhead No. 3, 50 per cent.....		7,233.71	
9. Transportation (motor).....			22,016.60
1 chauffeur, at \$150 per month.....	\$1,800.00		
9 chauffeurs, at \$115 per month.....	12,420.00		
	14,220.00		
25 per cent ordnance service subhead No. 12, 75 per cent.....		10,665.00	
3 tractor drivers, at \$4.40.....	\$4,131.60		
Gas, oils, grease, etc.....	5,220.00		
Spare parts.....	2,000.00		
		11,351.60	
Total.....		22,016.60	

Proving grounds, Army—Estimated needs, Aberdeen Proving Grounds, Md., for fiscal year 1922—Continued.

		Expended fiscal year 1920. (Money allotted under other subheads.)	Estimate, fiscal year 1922.
10. Transportation (rail).....			\$54,347.73
1 foreman, at \$185 per month.....	\$2,220.00		
1 track foreman.....	2,200.00		
2 brakemen, at \$5 per day.....	3,130.00		
2 locomotive engineers, at \$6.16 per day.....	3,856.16		
2 locomotive firemen, at \$4.28 per day.....	2,679.28		
2 hostlers, at \$5 per day.....	3,130.00		
15 laborers, at \$4 per day.....	18,772.00		
		\$35,987.44	
Maintenance of tracks and ways equipment, etc.....		18,360.29	
Total.....		54,347.73	
11. Maintenance and operation of proving ground patrol board.....			10,274.50
1 mechanic (launch operator).....	\$1,950.00		
1 boat mechanic.....	1,500.00		
Do.....	1,230.00		
1 mechanic (repair man).....	1,500.00		
Gasoline, oil, grease, and repairs, including spare parts.....	4,094.50		
Total.....	10,274.50		
12. Power, heat, and light for buildings used in connection with manufacturing and experimental work.....		118,712.12	
<p>The main power house at this post, known as Power House No. 3, is operated for the purpose of furnishing current for power and lighting, and for heating, during the winter season, buildings used for both testing and experiment, also offices, storehouses, and other buildings not used in connection with testing. The expense of this unit for the generation of both electric current and heat for the year is as follows:</p>			
1 engineer, 24 hours per day, at \$0.65 (365 days).....	\$5,694		
1 assistant engineer, 24 hours per day, at \$0.55 (365 days).....	4,818		
2 firemen, 24 hours per day, at \$0.50 (365 days).....	8,760		
2 coal passers, 24 hours per day, at \$0.45 (365 days).....	7,884		
20 tons coal for 365 days, 7,300 tons, at \$10.10.....	73,730		
Material, oil, waste, etc.....	6,066		
		106,952.00	
<p>This plant is operated with the above personnel, supplies, and coal consumption for 365 days in the year. In addition to this, during the heating season or a period of 212 days in which heat is supplied to buildings connected with this unit, the following additional services and supplies are required:</p>			
1 fireman 24 hours per day, at \$0.50 (212 days).....	\$2,544.00		
1 coal passer, 24 hours per day, at \$0.45 (212 days).....	2,289.60		
36½ tons coal for 212 days, 7,738 tons, at \$10.10.....	78,153.80		
		82,987.40	
		189,939.40	
<p>The total cost of operating power house No. 3 being \$189,939.40, based upon calculation of power and steam should be divided as follows:</p>			
1. Maintenance of constant temperature magazine and furnishing of light, heat, and power used in connection with buildings used for testing and experiment, chargeable to shop expense.....		118,712.12	
2. Ordnance service, subhead No. 4, heating of offices, storehouses, and other buildings not used for testing or experiment, 25 per cent.....		47,494.85	
3. Ordnance service, subhead No. 5, illumination of grounds and buildings not used for testing and experiment, 12½ per cent.....		23,742.43	
Total charge to proving ground, Army.....	\$118,712.12		
Total charge to ordnance service.....	71,227.28		
	189,939.40		
<p>If the department can procure coal next year at \$5 per ton, it would mean a saving of approximately \$48,000 to appropriation proving ground, Army. The saving that will be effected during the year as a result of a reduction in the cost of labor or material will be used to employ additional employees for testing operations, because there are not sufficient soldiers to do the work and in this manner we will be enabled to accomplish the testing covered by the present program. The difficulty of forecasting the future as regards price of labor and materials must be appreciated.</p>			
13. Maintenance of water supply.....			4,035.00
1 filter operator, 24 hours (365 days), at \$0.50.....	\$4,380.00		
Oil, waste, and miscellaneous material.....	1,000.00		
Total.....	5,380.00		
25 per cent Ordnance Service subhead No. 6, 75 per cent.....		4,035.00	

Proving grounds, Army—Estimated needs, Aberdeen Proving Grounds, Md., for fiscal year 1922—Continued.

		Expended fiscal year 1920. (Money allotted under other subheads.)	Estimate, fiscal year 1922.
4. Telephone service in connection with testing and experimental work.....			\$12,000.00
Rental 150 stations, at \$3.60.....	\$540.00		
58½ miles line, at \$57.60 per mile.....	3,369.60		
Toll charges, at \$150 per mile.....	1,800.00		
Signal Corps pay roll, \$585 per mile.....	7,020.00		
Insurance and miscellaneous items.....	3,270.40		
Total.....	16,000.00		
25 per cent Ordnance Service subhead No. 9, 75 per cent.....		\$12,000.00	
15. Operation and maintenance of high explosive and constant temperature magazine and ammunition assembly plants (not including cost of power).....			21,000.00
1 foreman.....	\$1,800.00		
6 skilled workmen, at \$1,400.....	8,400.00		
1 engineer (3 shifts), at \$1,800.....	5,400.00		
Fuel, ammonia, etc.....	5,400.00		
Total.....	21,000.00		
16. Engineering section.....			11,852.00
1 chief draftsman.....	\$3,000.00		
2 mechanical draftsmen, at \$2,100.....	4,200.00		
1 mechanical draftsman.....	2,000.00		
1 tracer.....	1,252.00		
1 file clerk and blue print operator.....	1,400.00		
Total.....	11,852.00		
17. Firemen and guards.....			15,000.00
1 chief guard and fireman, at \$125.....	\$1,500.00		
1 assistant guard and fireman, at \$125.....	1,500.00		
10 guards and firemen.....	12,000.00		
Total.....	15,000.00		
18. Shops.....			89,891.50
This item includes minor repairs and alterations to ordnance incidental to testing, also repairing of butts and targets, clearing and grading ranges, and repair and maintenance of velocity and pressure-recording instruments.			
1 superintendent.....	\$2,900.00		
4 foremen, ¹ at \$2,400.....	9,600.00		
12 machinists, at \$6.80 per day.....	25,540.80		
6 auto machinists, at \$6 per day.....	11,268.00		
5 carpenters, at \$5.60 per day.....	8,764.00		
3 blacksmiths, at \$6 per day.....	5,634.00		
3 electricians, at \$6.40 per day.....	6,009.60		
4 plumbers, at \$6.40 per day.....	8,012.80		
2 sheet-metal workers, at \$6.40 per day.....	4,006.40		
3 helpers, at \$4.40 per day.....	4,131.60		
Repairs to shop machinery, special tools, etc.....	4,024.30		
Total.....	89,891.50		
19. Services of employees engaged in the preparation and maintenance of firing records, experimental reports, financial records, personnel records, stock records, also procuring and issuing of supplies for experimental purposes.....			43,620.00
1 clerk (stock record).....	\$2,400.00		
1 clerk (pay roll).....	2,400.00		
1 clerk (procurement).....	2,300.00		
3 clerks, at \$2,100.....	2,100.00		
2 clerks, at \$2,000.....	4,000.00		
3 clerks, at \$1,800.....	5,400.00		
3 clerks, at \$1,500.....	4,500.00		
2 clerks and stenographer, at \$1,400.....	2,880.00		
7 clerks and stenographer, at \$1,420.....	9,940.00		
4 clerks and stenographer, at \$1,400.....	5,600.00		
2 clerks, at \$1,050.....	2,100.00		
Total.....	43,620.00		

¹ The foremen here indicated are leading men in the various trades represented, who perform the work of said trade in addition to supervising the particular job on which they may be engaged.

The total number of employees included in the above estimate is 291.

LIST B.

Statement showing number of employees by designation and salary at Aberdeen Proving Ground, February 1, 1921, with the appropriation indicated against which salary is chargeable.

With reference to those employees whose salary is chargeable against "Proving grounds, Army," this appropriation will be used as long as funds are available, after which time applicable manufacturing appropriations will be used.

The number of employees changes from month to month, depending upon the amount of work on hand, and the average expected personnel for fiscal year 1922 is given in the estimate. (List A.)

	Salary.	Proving ground, Army.	Ordnance service.	Repair of arsenals.
Engineering section:				
1 draftsman.....	\$3,000.00			
1 draftsman.....	2,300.00			
1 draftsman.....	2,100.00			
1 draftsman.....	2,000.00			
1 file clerk.....	1,420.00			
1 copyist draftsman.....	1,252.00			
1 blue-print boy.....	900.00			
1 clerk.....	1,800.00			
1 clerk (typist).....	1,050.00			
9 Total.....		\$15,822.00		
Instrument section:				
1 clerk.....	1,300.00			
1 proof assistant.....	2,450.00			
2 proof assistants, at \$1,800 per annum.....	3,600.00			
1 proof assistant.....	2,000.00			
2 proof assistants, at \$1,600 per annum.....	3,200.00			
1 proof assistant.....	1,400.00			
1 photographer.....	1,800.00			
10 Total.....		15,750.00		
Range and ballistic section:				
2 proof directors, at \$2,200 per annum.....	4,400.00			
1 proof assistant.....	2,000.00			
2 proof assistants, at \$1,600 per annum.....	3,200.00			
1 proof assistant.....	1,400.00			
1 proof assistant.....	1,200.00			
1 chief civilian gunner.....	1,600.00			
1 computer.....	1,800.00			
1 computer.....	1,600.00			
8 laborers, at \$4 per diem.....	10,016.00			
18 Total.....		27,216.00		
Powder-charge section:				
1 foreman.....	1,800.00			
1 skilled laborer, at \$4.40 per diem.....	1,377.20			
1 laborer, at \$4 per diem.....	1,252.00			
3 Total.....		4,429.20		
Mobile artillery section:				
1 proof director.....	2,200.00			
1 foreman, at \$150 per month.....	1,800.00			
18 laborers, at \$4 per diem.....	22,536.00			
20 Total.....		26,536.00		
Railway and seacoast artillery:				
1 proof assistant.....	1,600.00			
1 foreman, at \$225 per month.....	2,700.00			
1 foreman, at \$6.40 per diem.....	2,003.20			
1 foreman, at \$165 per month.....	1,980.00			
1 foreman, at \$165 per month.....	1,980.00			
2 carpenters, at \$5.60 per diem.....	3,505.60			
2 carpenter's helpers, at \$4.40 per diem.....	2,754.40			
1 skilled laborer, at \$4.80 per diem.....	1,502.40			
29 laborers, at \$4 per diem.....	36,308.00			
39 Total.....		54,333.60		

	Salary.	Proving ground, Army.	Ordnance service.	Repairs of arsenals.
Bomb and bomb sight section:				
1 proof assistant.....	\$2,000.00			
1 foreman, at \$150 per month.....	1,800.00			
1 foreman, at \$130 per month.....	1,560.00			
2 carpenters, at \$5.60 per day.....	3,505.60			
3 skilled laborers, at \$4.40 per day.....	4,131.60			
1 laborer, at \$4 per day.....	1,252.00			
9 Total.....		\$14,249.20		
Firing record section:				
1 clerk.....	3,000.00			
1 clerk.....	2,000.00			
1 clerk.....	1,800.00			
1 clerk.....	1,420.00			
1 clerk.....	1,400.00			
1 clerk.....	1,300.00			
6 Total.....		10,920.00		
Animal transportation:				
1 foreman, at \$180 per month.....	2,160.00			
1 horseshoer, at \$6 per day.....	1,878.00			
8 teamsters, at \$4 per day.....	10,016.00			
10 Total.....		7,027.00	\$7,027.00	
Carpenter shop:				
1 foreman.....	2,400.00			
6 carpenters, at \$5.60 per diem.....	10,516.80			
1 laborer, at \$3.60 per diem.....	1,126.80			
8 Total.....		5,617.44	1,404.36	\$7,021.80
Electrical shop:				
1 foreman, at \$7.60 per diem.....	2,378.80			
1 foreman, at \$7.20 per diem.....	2,253.60			
2 high-tension linemen, at \$6.80 per diem.....	4,256.80			
2 electricians, at \$6.40 per diem.....	4,640.00			
1 radio repair man, at \$5.20 per diem.....	1,627.60			
1 battery repair electrician, at \$6.40 per diem.....	2,003.20			
8 Total.....		8,263.20	4,957.92	3,305.28
Automobile repair station:				
2 machinists, at \$6.40 per diem.....	4,006.04			
2 automobile mechanics, at \$6 per diem.....	3,756.00			
1 motorcycle mechanic, at \$6 per diem.....	1,878.00			
5 Total.....		7,230.03	2,410.01	
Tank, tractor, and trailer repair section:				
1 caterpillar tractor expert.....	4,200.00			
1 tractor mechanic, at \$6 per diem.....	1,878.00			
2 tractor mechanics, at \$5.60 per diem.....	3,505.60			
1 tractor mechanic, at \$5.12 per diem.....	1,602.56			
1 machinist, at \$5.12 per diem.....	1,602.56			
6 Total.....		12,788.72		
Paint shop. 2 painters, at \$6 per diem.....				
	3,756.00	375.60	375.60	3,004.80
Plumbing shop:				
1 foreman.....	2,400.00			
2 plumbers, at \$6.40 per diem.....	4,006.40			
1 steam-fitter, at \$6.40 per diem.....	2,003.20			
1 sheet metal worker, at \$6.40 per diem.....	2,003.20			
2 laborers, at \$4 per diem.....	2,504.00			
1 boy laborer, at \$2.56 per diem.....	801.28			
8 Total.....		3,429.52	3,429.52	6,859.04
Main power house:				
3 engineers, at \$6 per diem.....	5,634.00			
3 oilers, at \$4.80 per diem.....	4,507.20			
6 firemen, at \$4.80 per diem.....	9,014.40			
6 coal passers, at \$4 per diem.....	7,512.00			
18 Total.....		20,000.70	6,666.90	

	Salary.	Proving ground, Army.	Ordnance service.	Repair of arsenals
Motor transportation:				
1 garage foreman.....	\$1,680.00			
1 auto mechanic, at \$6 per diem.....	1,878.00			
1 vulcanizer, at \$5.60 per diem.....	1,752.80			
1 chauffeur.....	1,500.00			
11 chauffeurs, at \$1,380 per annum.....	15,180.00			
1 laborer, at \$4 per diem.....	1,252.00			
16 Total.....		\$17,432.10	\$5,810.70	
Transportation, rail:				
1 traffic clerk.....	\$1,800.00			
2 locomotive engineers, at \$6.16 per diem.....	3,856.16			
2 locomotive firemen, at \$4.28 per diem.....	2,679.28			
2 brakemen, at \$5 per diem.....	3,130.00			
2 hostlers, at \$4.56 per diem.....	2,854.56			
1 machinist, at \$6 per diem.....	1,878.00			
1 laborer, at \$4 per diem.....	1,252.00			
1 foreman, at \$140 per month.....	1,680.00			
10 laborers, at \$3.60 per diem.....	11,268.00			
22 Total.....		30,398.00		
Boat transportation:				
1 launch captain.....	1,950.00			
2 assistant launch captains, at \$1,500 per annum.....	3,000.00			
1 gas launch engine man.....	1,800.00			
2 gas launch engine men, at \$1,500 per annum.....	3,000.00			
6 Total.....		9,750.00		
Machine shop:				
1 master mechanic.....	2,900.00			
1 machinist, at \$180 per month.....	2,160.00			
3 machinists, at \$6.80 per day.....	6,385.20			
2 machinists, at \$6.40 per day.....	4,006.40			
1 machinist, at \$6 per day.....	1,878.00			
4 helpers (machinist), at \$4.40 per day.....	5,508.80			
1 welder, at \$6 per day.....	1,878.00			
1 skilled laborer, at \$4.40 per day.....	1,377.20			
4 laborers, at \$4 per day.....	5,008.00			
8 laborers, at \$3.60 per day.....	9,014.40			
26 Total.....		36,104.40	2,005.80	\$2,005.80
Blacksmith and forge shop:				
1 foreman, at \$175 per month.....	2,100.00			
2 blacksmiths, at \$6 per day.....	3,756.00			
1 riveter, at \$6 per day.....	1,878.00			
4 Total.....		6,960.60		773.40
Emergency and repair crew:				
1 engineer, \$6 per diem.....	1,878.00			
1 fireman, \$4.40 per diem.....	1,502.40			
1 coal passer, \$4 per diem.....	1,252.00			
3 Total.....		3,474.30	1,158.10	
Filteration plant: 3 filter operators, \$4.80.....	4,507.20	3,080.40	1,126.80	
Mulberry Point constant-temperature magazine: 3 skilled laborers, \$4.40.....	4,131.60	4,131.60		
Refrigerating plant: 1 refrigerating-plant operator (quartermaster).....	1,502.40			
Hospital heating plant: 3 firemen, \$4.64 per diem (quartermaster).....	4,356.96			
Aviation heating plant: 3 firemen, \$4.64.....	4,356.96	4,356.96		
Locomotive crane section:				
1 crane foreman, \$150 per month.....	1,800.00			
6 crane engineers, \$6.16 per diem.....	11,568.48			
5 crane firemen, \$4.28 per diem.....	6,698.20			
5 hostlers, \$4.56 per diem.....	8,322.00			
1 laborer, \$4 per diem.....	1,252.00			
18 Total.....		29,640.68		
Guards:				
1 chief of guards.....	125.00			
14 policemen.....	100.00			
15 Total.....		11,725.00	6,575.00	

	Salary.	Proving ground, Army.	Ordnance service.	Repairs of arsenals.
Fire guards:				
1 foreman fire fighter.....	\$125. 00			
5 fire guards.....	100. 00			
6 Total.....		\$5, 625. 00	\$1, 875. 00	
NOTE.—1 fire guard, at \$100 per month, during temporary absence of regular employee on leave.				
Office of commanding officer:				
1 office manager.....	3, 600. 00			
1 clerk.....	1, 400. 00			
2 Total.....			5, 000. 00	
Civilian personnel section:				
1 clerk.....	1, 420. 00			
1 clerk (in office of district secretary).....	1, 600. 00			
2 Total.....			3, 020. 00	
1 clerk.....	1, 420. 00			
2 clerks, at \$1,300.....	2, 600. 00			
3 Total.....			4, 020. 00	
Mail and record section:				
1 clerk.....	1, 800. 00			
1 clerk.....	1, 400. 00			
1 clerk.....	1, 300. 00			
1 clerk.....	1, 180. 00			
1 clerk.....	1, 050. 00			
1 skilled office laborer.....	1, 050. 00			
1 messenger girl.....	600. 00			
7 Total.....			8, 380. 00	
Allotment section:				
1 clerk.....	1, 800. 00			
1 clerk.....	1, 420. 00			
2 Total.....			3, 220. 00	
Disbursing section:				
1 clerk.....	2, 400. 00			
1 clerk.....	1, 800. 00			
2 Total.....			4, 200. 00	
Voucher section:				
1 clerk.....	1, 700. 00			
1 clerk.....	1, 200. 00			
2 Total.....			2, 900. 00	
Procurement (purchase) section:				
1 clerk.....	2, 300. 00			
1 clerk.....	1, 050. 00			
2 Total.....		2, 680. 00	335. 00	\$335. 00
Labor and sanitary section:				
1 foreman, at \$175.....	2, 100. 00			
1 skilled laborer, at \$4.40.....	1, 377. 20			
4 laborers, at \$4.....	5, 008. 00			
10 laborers, at \$3.60.....	11, 268. 00			
3 janitors, at \$3.30.....	3, 613. 50			
19 Total.....			1, 168. 35	22, 198. 35
Stock record section (office):				
1 clerk.....	2, 700. 00			
1 clerk.....	2, 400. 00			
2 clerks, at \$1,500.....	3, 000. 00			
1 clerk.....	1, 300. 00			
1 clerk.....	1, 180. 00			
1 assistant storehouse keeper.....	1, 680. 00			
7 Total.....		7, 356. 00	4, 904. 00	
Storehouse section: 1 storehouse keeper (in charge).....	2, 400. 00		2, 400. 00	

	Salary.	Proving ground, Army.	Ordnance service.	Repair of arsenal.
Main storehouse (A-41):				
1 clerk.....	\$2,400.00	.....	.....	.....
1 assistant storekeeper.....	1,680.00	.....	.....	.....
8 laborers, at \$4.....	10,016.00	.....	.....	.....
10 Total.....			\$14,096.00	.....
West side storehouse: 1 laborer, at \$4.....	1,252.00	.....	1,252.00	.....
Garage stock room: 1 laborer, at \$4.....	1,252.00	\$939.00	313.00	.....
Gas and oil station: 1 laborer, at \$4.....	1,252.00	939.00	313.00	.....
Ammunition and artillery storehouses (F-11 and F-26):				
1 clerk.....	2,100.00	.....	.....	.....
1 assistant storehouse keeper, at \$140.....	1,680.00	.....	.....	.....
2 laborers, at \$4.....	2,504.00	.....	.....	.....
1 foreman, at \$140 per month.....	1,680.00	.....	.....	.....
1 laborer, at \$4.....	1,252.00	.....	.....	.....
6 Total.....		9,216.00	.....	.....
Coal yard:				
1 assistant foreman, at \$110.....	1,320.00	.....	.....	.....
1 laborer, at \$3.60.....	1,128.80	.....	.....	.....
2 laborers, at \$4.....	2,504.00	.....	.....	.....
4 Total.....		3,713.10	1,237.70	.....
Loading and unloading group:				
3 laborers, at \$4.....	3,756.00	.....	.....	.....
5 laborers, at \$3.60.....	5,634.00	.....	.....	.....
1 chauffeur.....	1,200.00	.....	.....	.....
9 Total.....		5,295.00	5,295.00	.....
Grand total.....		426,805.35	106,876.76	\$45,503.47
Grand total covering personnel only.....		579,185.58	.....	.....

The total number of employees on this list is 387, in addition there are 45 other employees at the proving ground not connected with its operation as an experimental and testing plant, of which 31 are chargeable to "field service" operations; 5 to ordnance school of application; 6 to designing operations of the "manufacturing service," and 3 are school-teachers.

Mr. SLEMP. Suppose an engine got out of shape, would you have to pay for it out of this appropriation?

Col. RUGGLES. We would have to pay for its repair out of this appropriation, yes; and the boats are repaired out of this appropriation. Anything that happens to the boats must be paid for out of this appropriation.

Mr. SLEMP. I think you have two too many boats.

Col. RUGGLES. Well, we have from 20 to 25 miles of shore line to cover; you have observers that you have to take 20 miles down the bay every day we fire, and you must have a boat standing by to rescue people who fall into the water. I do not really see how we could get along with a fewer number of boats. Then you must remember that one of those boats may at any time be out of commission, so that we need all we have. They are not large boats; they are really launches; they are not big boats.

Mr. SLEMP. You are going to supply a statement showing what it costs to run those boats?

Col. RUGGLES. Yes.

Mr. EAGAN. By using enlisted men could you materially reduce the cost of running the proving ground?

Col. RUGGLES. If we had more enlisted men, it would run down the cost of the proving ground.

Mr. SLEMP. What about more officers?

Col. RUGGLES. It would reduce the cost in this way: That if we had more officers we could do away with some of our proof directors, but the proof directors are not paid as much as the officers.

Mr. EAGAN. Of course, the civilian employees do not get quarters or subsistence.

Col. RUGGLES. There are a few that do.

Mr. SLEMP. How many?

Col. RUGGLES. I could not say offhand. We have an instructor in the school who has a set of quarters; we have a chief electrician who has a set of quarters; the master mechanic has a set of quarters. I should say that about half a dozen of these have quarters, and then a number of civilian foremen are housed in temporary barracks. However, those quarters are rented to them; they do not get them for nothing.

Mr. SLEMP. Have you reduced your civilian force this year?

Col. RUGGLES. Yes; this force has been reduced by more than 50 per cent since the beginning of the year.

Mr. SLEMP. It was about 800 on July 1, 1920?

Col. RUGGLES. I think it was even more than that; toward the end of last year it was more than that. We started out at the beginning of this year with about 475 and we have gone down to about 400. But, as I say, we are not keeping up the work; we are not firing as many rounds as we should fire. If this pilot material comes we must do something. We are counting on the cost of material going down and the cost of labor—besides reorganizing, as we are doing all the time—in order to enable us to carry on the work next year with the money we are spending this year and at the same time do a great deal more work.

Gen. PEIRCE. In reference to the use of enlisted men, I might say that under the Army reorganization act we are authorized a total of 4,500 enlisted men for all of our ordnance establishments. If they apply a pro rata cut throughout under the recent resolution, we will only have about 66 per cent of that 4,500, or around 2,800. You can not reduce the number of our enlisted men and civilians and at the same time do all of the necessary work. It is comparatively a simple problem of mathematics.

COST OF OPERATION OF BOATS AND RAILROAD.

Mr. SLEMP. General, have you gone over this matter of the Aberdeen proving ground?

Gen. PEIRCE. Yes, sir. I am satisfied that the figure which Gen. Ruggles gives, \$600,000, will be the ultimate cost. The difference in cost between what may be provided under this item and the \$600,000 will have to come out of manufacturing appropriations or we will not be able to do the work.

Col. RUGGLES. The cost of the railroad is about \$55,000.

Mr. SLEMP. That is for the crews, the conductors, engineers, repair men, etc.?

Col. RUGGLES. Yes, sir; it costs us \$55,000 for the railroad. I can also give you the cost of the boats. The cost of the boats for the year is \$10,274.

Mr. SLEMP. Does that include the pay of the crews?

Col. RUGGLES. The pay of the crews, gasoline, and repairs.

Mr. SLEMP. Are you using them all the time?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. Winter and summer?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. That is something over \$60,000.

Col. RUGGLES. That is \$65,000. The total expense of running the machine shop is \$89,891. I suppose a part of this is for repairs to the railroad, too, although it is lumped together. I presume that covers repairs to engines, etc., because it is all put in there. The cost is \$89,891.

Mr. SLEMP. Of which about 66 $\frac{2}{3}$ per cent will apply against this item.

Col. RUGGLES. No; all of this item is applied to the proving ground; it is for repairs to automobiles, repairs to railroad transportation, boats, repairs to carriages if they break, and repairs to any of our appliances that break. The total cost is \$89,891; that is the machine-shop cost. I can give you the total cost of the power plant. With the present price of coal the total cost of the power plant is \$190,000, and there is a part of that charged to ordnance service.

Mr. SLEMP. How much?

Col. RUGGLES. Thirty-seven and one-half per cent is charged to ordnance service.

Mr. SLEMP. Leaving about \$120,000?

Col. RUGGLES. That is the actual cost of the power, heating, lighting, furnishing water, and so on. Now, it is utterly impossible to cut that down.

COAL.

Mr. SLEMP. Let us see if that is so. Do you use coal in your power plant?

Col. RUGGLES. We use about 15,000 tons of coal a year.

Mr. SLEMP. What did you pay for coal this year?

Col. RUGGLES. \$10.10.

Mr. SLEMP. What do you estimate it will cost next year?

Col. RUGGLES. Well, we hope we will get it for half that.

Mr. SLEMP. Well, what do you estimate for it?

Col. RUGGLES. We estimate that at \$10.10 this year, the same as we paid last year.

Mr. SLEMP. Do you think that is fair?

Col. RUGGLES. Well, we expect it to go down, although it has not gone down yet.

Mr. SLEMP. What kind of coal do you buy?

Col. RUGGLES. Bituminous coal.

Mr. SLEMP. Where from?

Col. RUGGLES. We get it through the Quartermaster Corps, and I do not know where they get it; they make the contracts, and they sometimes get it from one dealer and sometimes from another.

Mr. SLEMP. You tell me you estimate—and Gen. Peirce says he has gone over this—15,000 tons of bituminous coal, which is simply ordinary coal, at \$10 a ton.

Col. RUGGLES. That is what we paid for it this year.

Mr. SLEMP. I know that, but I am talking about next year.

Col. RUGGLES. We hope we will save half of that.

Mr. SLEMP. That is the price delivered at Aberdeen?

Col. RUGGLES. Yes, sir. I am counting on those savings in order to be able to fire three times as many rounds as I am firing now.

Mr. SLEMP. I really do not think that is a proper way to submit an estimate.

Col. RUGGLES. Experimental work is exceedingly difficult to estimate.

Mr. SLEMP. Let us get this coal business settled. You say you use 15,000 tons of coal?

Col. RUGGLES. Suppose we cut it in half.

Mr. SLEMP. That ought not to cost you, delivered at Aberdeen, more than \$5 a ton.

Col. RUGGLES. Then we would save \$75,000. Now, we do not know what we will save on labor—and nobody can tell how much we will save on labor. The only thing on which we can see a saving at this time is on the coal, but we do not know how much we can save on labor, because there is no estimating what you can save on labor.

What we are planning to do and hope to do is that by securing a decrease in the cost of commodities, a decrease in the cost of labor, and, perhaps, by securing a better reorganization—on which we are working all the time—we may be able to produce just three times as much as we are producing now, because we are only producing at the rate of 16,000 rounds a year, whereas we see before us the absolute necessity of producing 78,000, and we are hoping we can do three times as much work for the same money we are spending this year. When you have as big a place as the proving ground you have got to maintain your power house, you have got to maintain your railroad, you have got to maintain your boats, you have got to maintain your clerks for filing records, and you have got to maintain your miscellaneous people for repairs. Now, having reduced what you might call the initial overhead to a minimum basis, every dollar you save is worth more than the dollars you have already been spending; and we hope we can do it.

TEST OF PILOT GUN.

Mr. SLEMP. Suppose you have one pilot gun; in order to test it, how many rounds must you fire?

Col. RUGGLES. It depends upon the gun, of course.

Mr. SLEMP. Take one of these 75-millimeter guns.

Col. RUGGLES. Twelve thousand rounds are fired for that purpose.

Mr. SLEMP. Do you mean to say that 12,000 rounds are required to test that gun?

Col. RUGGLES. Yes, sir; that amount is required for the gun, the mount, and for the ammunition that goes with it. That covers the fuses, projectiles, powder, and mount. It is like testing a new type of automobile.

Mr. SLEMP. I can not believe that 12,000 rounds are necessary for that purpose.

Gen. PEIRCE. You must test that matériel pretty much to destruction. We must find out the effect upon it of long-continued firing.

Mr. SLEMP. In the case of a 16-inch gun, the accuracy life is only 125 rounds, is it not?

Gen. PEIRCE. The accuracy life of the piece diminishes almost in geometric ratio as you go up in caliber.

Col. RUGGLES. How many miles do you suppose they run a new type of automobile in testing it?

Mr. SLEMP. When we were talking about boosters and experimental types of ammunition, they asked for only 1,000 rounds or charges with which to test this ammunition of new types. You test all of the parts at the same time, do you not?

Col. RUGGLES. A great deal of that firing of 12,000 rounds would be done with cast-iron slugs in order to test the gun carriage and to see which parts break or wear out too fast. The parts that fail are redesigned and tested. The endurance test also provides the basis for the number of spare parts that must be furnished and inaugurated in standard supply tables. The gun should be tested until it is worn out. As a matter of fact, that is what we ought to do, but we are not planning to do that much. We have a self-propelled mount of two types, the Christie and the Holt, and two types of trail, the box and the split. There are four different kinds of matériel right there, and you would have only 3,000 rounds for the test of each.

Mr. SLEMP. I do not want to place myself in the attitude of being an expert, but I do not see the logic of using 3,000 shells for the purpose of testing each of the different kinds of trails. One is split and the other is a box.

Col. RUGGLES. There are a lot of differences besides that. The traverse mechanisms and the elevating mechanisms are different.

Mr. SLEMP. Stop and think what you are running into. If you take a gun and fire it 12,000 rounds for the purpose of testing it, I suppose the cost would be from \$5 to \$10 per round.

Col. RUGGLES. No, sir; I do not think so.

Mr. SLEMP. What would be the cost in the case of the 75-millimeter gun?

Col. RUGGLES. It would be about that.

Mr. SLEMP. Then the cost of testing would be about \$120,000. That would be the cost of testing just one type of gun.

Col. RUGGLES. No, sir; it means more than that.

Mr. SLEMP. I mean the cost to the Government in providing the shells.

Col. RUGGLES. You mean the cost of the material?

Mr. SLEMP. Yes. If it costs that much for the test it is a pretty expensive proposition.

Col. RUGGLES. Yes, sir; but when you put that gun into the service you must know that it is the right kind of gun. You must get it right before you put it into production, because the cost there might run into billions of dollars. You must have it right, and you can not put it into service until it is right, and you can not commit yourself to quantity production of that gun until you know that it is right.

Mr. SLEMP. I do not see how 12,000 rounds would mean anything more than 5,000 rounds, because the pressure and stress would be the same.

Col. RUGGLES. Guns do not break when you fire 100 rounds. They may begin to break after you have fired 1,000 rounds, and the various parts and mechanisms may then begin to fail. It is like testing a new type of automobile. The automobile does not fail in the first 2,000

or 3,000 miles, and the test must be extended. It is very essential that this matériel should have endurance on the battle field. If it began to give out in battle, it would be a very serious matter, and it might mean the furnishing of twice as many guns and carriages in time of war.

Mr. SLEMP. In using this matériel during the war, you did not fire them 12,000 rounds, did you?

Col. RUGGLES. Some of them were fired more than that.

Mr. SLEMP. You take a certain number of guns and fire them, and then calculate the result in percentage form, do you not?

Col. RUGGLES. When we are accepting them; yes, sir. If they are of an accepted type, they would be fired a very limited number of rounds. But when we come to test the first gun or carriage of an entirely new model, we have to test it thoroughly before going into quantity production.

Gen. PEIRCE. In proving a gun for acceptance, it would be fired about five full charges and seven reduced charges.

Col. RUGGLES. It is a simple matter after you once determine that a new type is satisfactory, but in the case of a new type a thorough and exhaustive test must be given. It is comparable to the shock test that a manufacturer gives to a new type of automobile that he is bringing out.

Mr. SLEMP. Let us see if that is so. They are getting out new types of cars every year, with just little additions and alterations?

Col. RUGGLES. Yes, sir; with very slight variation in the model, but when they get out an entirely new model, like the new Overland model, a thorough test is made. I think they advertised the fact that they ran that car for two or three years before they put it into production. The mileage made was tremendous.

Mr. SLEMP. That would be a matter of burning gas.

Col. RUGGLES. They would try to find out whether the model would give trouble in service. Any new type of engine is thoroughly tested. For instance, Mr. Holt has just made two tractors and has given both of them an exhaustive test. As a result of the test, both of them have been scrapped. In testing a new type of tractor, he runs it until it plays out. I asked him why he had not perfected a military tractor, and he said that he had not gotten his new 2½-ton tractor in shape where he could design one for military purposes. He said, "I have made two of them and have run them for thousands of miles and have scrapped both of them." You can not build a complicated machine like a tractor or gun carriage, and get it right the first time. You have got to give it an exhaustive test and find out its weaknesses, and then build it all over again. Then you will have to give it another exhaustive test. When you have located all of the difficulties that are to be found in that way and when you have the material perfected, then you give it a relatively small amount of testing before accepting each individual unit. I know that is true of every new machine, whether it be automobile, tractor or truck, or a piece of electrical machinery. In commercial life, the new type is always subjected to a test that wears it out. It is worn out to see whether or not it will give trouble. We can not afford to put machines in the Army that will give out in one-third the time in which they ought to give out, thus making us provide three times as many of them.

WEDNESDAY, FEBRUARY 9, 1921.

Gen. PEIRCE. As I understand, you wanted to ask Col. Ruggles something more about the proving ground.

Mr. SLEMP. Yes. I want to ask him about those forty-two 14-inch guns. How many rounds are you going to fire from those?

Col. RUGGLES. Those being of the standard type, we would only fire about four rounds apiece, because that is a well-tested and standard type.

Mr. SLEMP. What about the 16-inch guns?

Col. RUGGLES. Of course, with a big gun we do not fire as many as we do with a smaller gun.

Mr. SLEMP. Are you willing to modify your 12,000 rounds proposition, having slept over it last night?

Col. RUGGLES. No; because that is a very light type of gun, and as the guns get bigger we reduce the number of rounds.

Mr. SLEMP. I do not think of anything else than that.

Col. RUGGLES. You asked me for some details and I have wondered whether this will answer [submitting statement]. That gives the cost of railroad transportation, the cost of the boats, etc.

Mr. SLEMP. Did you have any boats at Sandy Hook?

Col. RUGGLES. We had a steamer which really cost more than the boats we have at Aberdeen; we had a tug there. These boats are used for this purpose: We have our observers down along the bay, who not only have to observe our shots and tell us where they strike but they have to observe to see that no people are in the line of fire that will be shot.

Mr. SLEMP. You put that in the record yesterday?

Col. RUGGLES. Yes, sir.

Mr. SLEMP. Well, put the statement in the record to which you have referred and then I understand you are going to state the character of the work done by all your employees—so many mechanics, so many caretakers, so many to operate the railroad, so many to operate the boats, so many in the power house, and so on. That is all we want.

Col. RUGGLES. Very well.

Mr. ANTHONY. You refer a great deal to the accuracy life of the various guns. What do you do with them after they have gone through that accuracy life? Do you rebores them?

Col. RUGGLES. Yes, sir; we take the tubes out and put others in, and then the guns are just as good as new.

Mr. ANTHONY. What percentage of the original cost of the gun does it cost to put in a new tube?

Mr. SLEMP. I think it is about 40 per cent.

Col. RUGGLES. I think that is high, but I do not have direct charge of that now; I think 40 per cent is high; I should have said not over 20 per cent of the original cost of the guns. I would like to say that in estimating on experimental work our tests may not be at all what we expect them to be, because we may run into difficulties; if everything goes smoothly with experimental work it does not take very long to make a test, but if things begin to fail we have got to find out why they fail. So there is no way that I know of to estimate upon work which is so variable as experimental firing than to base it on past experience, coupled with the amount of work that you have

got to accomplish. But to say that a particular piece of work is going to cost so much is absolutely impossible; it may cost 10 times that much.

Mr. SLEMP. Our experience is that it does cost 10 times that much.

Col. RUGGLES. Well, that is experimental work, because you do not know what you are going to run into.

THURSDAY, FEBRUARY 10, 1921.

STATEMENTS OF BRIG. GEN. J. M. CARSON, CHIEF OF THE CONSTRUCTION SERVICE, AND LIEUT. C. B. F. BRILL, QUARTERMASTER CORPS.

BARRACKS AND QUARTERS, SEACOAST DEFENSES, UNITED STATES.

Mr. SLEMP. Gen. Carson, you are connected with the Quartermaster Department of the Government?

Gen. CARSON. Yes; I am Assistant Quartermaster General and Chief of the Construction Service.

Mr. SLEMP. You have an item in the bill for barracks and quarters, seacoast defenses. You had last year an appropriation of \$50,000 for expenditure in connection with this item and you are asking this year for an appropriation of \$125,000. Please state the condition of your balances and how you spent the \$50,000 received last year and how you wish to spend the \$125,000 requested.

Gen. CARSON. The \$50,000 was allotted for various projects that came up during the course of the year, and it has practically all been spent.

Col. SMITH. The records of the office of the Chief of Finance show that it has all been allotted except \$700.

CURRENT EXPENDITURES.

Lieut. BRILL. Mr. Chairman, this is entirely a new construction appropriation and that money has all been spent for specific items presented to the committee last year. We presented items to the committee amounting to a total of over \$200,000, and of the various items presented the most important ones were picked out and this \$50,000 was used for the accomplishment of those purposes. If you wish a list of them we can insert that in the record.

Mr. SLEMP. I would be glad to have that.

Lieut. BRILL. Fort Adams, R. I., ordnance machine shop, \$2,700; Fort Preble, Me., remodelling the coast defense machine shop and building an addition, 20 by 20 feet, \$4,000; Fort Wadsworth, N. Y., quartermaster stable, 26 by 100 feet, frame, \$10,000; Fort Monroe, an additional story on the quartermaster office building, \$7,637; Fort Monroe, new booster pump house, \$4,800; Fort Crockett, an addition to the coast defense machine shop, \$4,000; Fort Moultrie, addition to the coast defense machine shop, \$4,000; Fort Worden, Wash., ordnance machine shop, \$10,000; Fort Winfield Scott, addition to machine shop, \$600; Fort Stevens, addition to the ordnance machine shop, \$700; Fort Rosecrans, ordnance machine shop, \$1,650.

Mr. SLEMP. As a matter of fact, you have not spent any money on barracks and quarters.

Lieut. BRILL. No, sir; that is just the name of the appropriation. All new construction at Coast Artillery posts is done under this appropriation.

Mr. SLEMP. Under what appropriation do you get the money for barracks and quarters—from the Army bill?

Lieut. BRILL. No, sir; if we built any at Coast Artillery posts it would be from this appropriation, but we have not built any this year.

Mr. SLEMP. The sundry civil bill carries an appropriation for barracks and quarters, but that has reference to the mobile Army?

Lieut. BRILL. Yes, sir; this is simply for the Seacoast Artillery, as the wording of the appropriation indicates.

Col. SMITH. My understanding is that this appropriation used to be carried in the sundry civil bill?

Maj. RUHLEN. The last regular appropriation was carried in the sundry civil bill, and during the war there were some deficiencies carried in the deficiency bill.

STRENGTH OF COAST ARTILLERY CORPS.

Mr. SLEMP. Do you know what the strength of the Seacoast Artillery now is?

Maj. RUHLEN. On December 31, 1921, the strength of the Coast Artillery Corps was 1,147 officers and 22,332 enlisted men.

Mr. SLEMP. The authorized strength of the Seacoast Artillery is 30,000 enlisted men. Have you barracks and quarters in the Seacoast Artillery for the entire 30,000 men, and also the officers?

Lieut. BRILL. Not for 30,000.

Mr. SLEMP. Have you ample barracks and quarters for the existing number?

Lieut. BRILL. Yes; for the existing number. There are one or two posts, I believe, where they are using temporary buildings put up during the war.

NOTE.—The total capacity in permanent construction of all Coast Artillery within the continental United States is as follows: Officers, 709; noncommissioned officers, 609; enlisted men, 20,706.

Mr. SLEMP. What are those posts?

Lieut. BRILL. One is Fort Story, Va. I think they are using temporary buildings there for some of the men. That is the only case I know of offhand.

PRESERVATION OF TEMPORARY STRUCTURES.

Mr. SLEMP. Are you preserving any of the temporary structures left at your various posts as a result of the war activities?

Gen. CARSON. Yes, sir.

Mr. SLEMP. To what extent is that being done?

Gen. CARSON. That I can not tell you exactly. They have preserved, so far as my observations have gone, such of them as were in good condition and might possibly be required. Some have had to be torn down because they have deteriorated or because they were too much

of a fire hazard to other buildings, or something of that kind; but some of the temporary buildings have been retained; and also a number of those buildings are used for storage purposes for surplus property that was left over from the war that we have not yet been able to dispose of.

Mr. SLEMP. Have you made an inventory of those buildings in any way?

Gen. CARSON. We have a report on them at each place, but I do not think we have yet consolidated it at all.

Mr. SLEMP. Have you made any specific investigation of the temporary structures to ascertain what you would want to preserve for the various seacoast posts and what you would wish to salvage, has that been done?

Gen. CARSON. That is being done gradually, post by post.

Mr. SLEMP. At what posts have you done that during this fiscal year?

Gen. CARSON. It would be rather difficult to give you a list of those from memory.

Mr. SLEMP. I wish you would put in the record any activities the War Department has undertaken during this fiscal year looking to the preservation or salvaging of temporary structures at the various posts created during the war.

Gen. CARSON. Yes.

(The statement follows:)

A survey at all posts and stations as to what temporary buildings were available for salvaging and what were to be retained has been conducted during the past few months. Reports have not been received to date from all posts. The only Coast Artillery posts at which temporary buildings have been reported available for salvaging are as follows: Fort Stevens, Cape May and Cape Henlopen (coast defenses of Delaware), Fort Monroe, Fort Story, Fort Moultrie, and Fort Winfield Scott. At all other Coast Artillery posts it is the desire of the local authorities to retain their temporary buildings, at least for the present.

Mr. SLEMP. I notice you did not use any money this year for protecting or restoring or making more useful any of these temporary structures.

Gen. CARSON. Oh, yes; we have from time to time, as the demands come in and as the money was available.

Mr. SLEMP. Your itemized statement does not indicate any money expended for that purpose.

Gen. CARSON. That was for new construction.

Lieut. BRILL. That was for new construction. After the buildings are built they are repaired and maintained from the ordinary appropriation.

Mr. SLEMP. That is not what I asked you. My question was that apparently you have spent no money at all at any of the posts on the temporary structures left by the war, except the machine shops.

Lieut. BRILL. We have spent the regular amount of money necessary to maintain and repair those buildings.

Mr. SLEMP. Where does that appear?

Lieut. BRILL. That was spent from the regular appropriations, barracks and quarters, maintenance and repair.

Mr. SLEMP. For the entire Army?

Lieut. BRILL. Yes, sir.

Mr. SLEMP. Then you do get money from the mobile army for barracks and quarters?

Lieut. BRILL. But not for new construction, simply for maintenance and repair after the structures are put up. This is entirely a new construction appropriation.

Mr. SLEMP. What is the necessity for spending a lot of money for machine shops which are really, in a way, small arsenals, when you have such large arsenal facilities throughout the United States?

Gen. CARSON. Every post has to have facilities of that kind to keep its equipment in repair. For instance, take a motor vehicle. It has to have more or less minor repairs constantly, but when you want to give it a general overhauling, you send it to a larger shop. The smaller shop would take care of the minor repairs. These machine shops are necessary at the various posts because there is a large amount of machinery involved in our coast artillery.

DETAILS OF ESTIMATES.

Mr. SLEMP. As to the amount of money you wish to spend during the coming fiscal year, is the itemized statement that you have submitted with the bill here, beginning with Revere, Mass., \$465, a correct statement?

Gen. CARSON. Yes, sir. Shall I read the list of items?

Mr. SLEMP. Yes.

Gen. CARSON. Fort Revere, Mass., installing steam-heating plant in building No. 5, \$465; Fort Levett, Me., well shelter, \$400; Fort Levett, installing power pump, including piping from well to reservoir, \$264; Fort Baker, Calif., platform scale, \$750; at the same place, changing aerial line to cable line, for power transmission, \$3,410; at the same place, completion of dock or wharf, \$6,000; Fort Barrancas, Fla., oil storage house, \$2,495; Fort H. G. Wright, N. Y., marine railway, with two skidways and boathouse, \$29,770; Fort Moultrie, S. C., incinerator, \$1,000; Fort Morgan, Ala., riprap breakwater, \$46,000.

Mr. SLEMP. Right there, General, how do you construct a riprap breakwater under an appropriation for barracks and quarters.

Gen. CARSON. Simply because the barracks and quarters is the title of the appropriation for new construction for seacoast defenses, and it has been carried on in that way.

Mr. SLEMP. A breakwater would be in about the same class as a sea wall.

Gen. CARSON. Well, yes; perhaps.

Mr. SLEMP. And that ought to come under another appropriation. Ought it not?

Gen. CARSON. I do not think so. It is for the protection of the property at this post and is a part of the permanent installation there. Of course, the remarks explain the necessity and the purpose of it.

Mr. FRENCH. We have handled similar items in other places in the bill, and I was wondering myself why that item should be included at this place.

Gen. CARSON. I can not explain further than to say that it has been customary to so group them.

Mr. SLEMP. Your position is that it was simply submitted to you in that way.

Gen. CARSON. As a request from the Coast Artillery, and we group them under this heading. It has been done in the past in this same way.

Mr. SLEMP. I doubt that. I doubt if any breakwater has been put in under this item of barracks and quarters in the past.

Gen. CARSON. Probably not a breakwater.

Mr. SLEMP. I do not think so.

Gen. CARSON. That is rather special and unusual.

Fort McKinley, Me., boathouse, \$9,000; Fort Preble, Me., boat-house, \$16,910; at the same place, heating system for building No. 9, \$3,500; at the same place, installation of toilet facilities, building No. 9, \$125; at the same place, laundry tubs in buildings Nos. 25 and 27, company barracks, \$650; Fort Winfield Scott, Calif., reinforced concrete covering on oil-storage tanks, \$3,336; at the same place, incinerator, \$414; Fort Worden, Wash., storage tanks for oil, \$511; total, \$125,000.

Mr. SLEMP. General, what are the A items or the preferential items in this list?

Gen. CARSON. These are the items that are classed as most important. This probably represents less than 20 per cent of the items that have come in. These have been sifted out.

Mr. SLEMP. I notice you do not have any request there for machine shops.

Gen. CARSON. Probably because they were either not asked for, or if asked for the Coast Artillery did not think they were of sufficient importance to go in now.

Mr. SLEMP. Your relation to these requests is somewhat ministerial; that is, you do not yourself decide upon the necessity for them.

Gen. CARSON. Our position to all these services is like that of an architect and client. We are the architects and builders and the other services are the clients.

Mr. SLEMP. You do not speak about the necessity for these items definitely, of your own knowledge?

Gen. CARSON. No; they come to us approved.

Mr. SLEMP. You simply transmit to the committee the requests that have been transmitted, approved, to you.

Gen. CARSON. Yes; and we prepare the estimates.

Mr. SLEMP. You make no study yourself of the necessity for granting these various requests?

Gen. CARSON. No, sir; because that is under, you might say, another branch of the service, and we simply act as their construction agents in carrying out the work. They must pass upon the necessity for them.

BOATHOUSES AT FORTS M'KINLEY AND PREBLE, ME.

Mr. FRENCH. Would there come under you the contract, for instance, of the necessity for the two boathouses, one at Fort McKinley and one at Fort Preble, one of them costing \$9,000 and the other one costing nearly \$17,000, or would that come under some other officer?

Gen. CARSON. The final decision on that would be with the Chief of Coast Artillery and the General Staff, but I happen to know why the difference exists.

Mr. FRENCH. I think we ought to know.

Gen. CARSON. I was going to explain that later on. That will come out in the remarks in reference to each one of the items.

Mr. FRENCH. I noticed the same thing with regard to the incinerators, one of them cost more than twice as much, at Fort Moultrie and at Fort Scott, and I was wondering if they were the estimates of two different engineers.

Gen. CARSON. No; there is a difference in the size.

STEAM-HEATING PLANT, FORT REVERE, MASS.

Mr. SLEMP. Taking up these various items somewhat in detail. first you ask for a steam-heating plant at Revere, Mass. Have you one there now?

Gen. CARSON. Not in this particular building. No. 5; no, sir. It is heated by stoves. This covers the installation of a steam-heating plant, including boiler, radiators, and connections in building No. 5.

Mr. SLEMP. That is, you already have the building and the plant and this is simply for the installation?

Gen. CARSON. No, sir; this is for the installation of the plant complete, including labor and materials. We have not the material on hand. It is a heating plant for this small building. The building is used as noncommissioned officers quarters and is the only set not equipped with a steam-heating system similar to all the others at the same place.

WELL SHELTER, FORT LEVETT, ME.

Mr. SLEMP. The next item is for the construction of a well shelter at Fort Levett, Me.

Gen. CARSON. That is based on this report: The present water system at the post is not sufficient to supply the quantity required, approximately 14,000 gallons a day. About 9,000 gallons a day are purchased locally and the balance must be furnished from wells on the post. The present facilities do not supply the required amount.

Mr. SLEMP. Where do you get water?

Gen. CARSON. They buy it from the local water supply of the community about the post.

Mr. SLEMP. And this \$400 is for the purpose——

Gen. CARSON (interposing). The two items amount to \$664, and that is for constructing a well shelter and purchasing a power pump to put in there to supplement the existing supply at the post which is not sufficient. They have to purchase 9,000 gallons from the outside and they require 14,000 gallons.

Mr. SLEMP. This would really mean an economy when you cut off the purchase of outside water; is that right?

Gen. CARSON. No; they have not enough water as it is. They need 14,000 gallons a day, according to the reports, and as we are informed, they can purchase only 9,000 gallons. They want to get 5,000 gallons more. They have wells on the post which are not sufficient with the present arrangements to give them the 5,000 gallons and the local

officers after investigation report that by walling up this well and installing a pump they can get about 3,000 gallons from this well which they are not getting now.

Mr. SLEMP. As I say, this would really be an economy.

Gen. CARSON. Yes; it would be an economy.

TRUCK SCALE, FORT BAKER, CALIF.

Mr. SLEMP. Because you would not have to purchase that much water. The next item is for a scale of truck capacity at Fort Baker, Calif., \$750.

Gen. CARSON. A large amount of coal, forage, and other supplies are delivered at this post under contract, and the delivery is made by motor trucks, usually large ones. It is necessary to weigh in this material in order that the responsible officer receiving and paying for it can check what he is getting. The scale there now was built for wagons. Of course, it can not weigh out 3 to 5 ton trucks, and this request is for a scale that will enable them to weigh the material received at the post.

Mr. SLEMP. How do they get along now?

Gen. CARSON. They have to guess at it.

Mr. SLEMP. Or do they unload the material at the present scale and weigh the material without the trucks.

Gen. CARSON. I could not say how they do it.

Mr. SLEMP. Of course, they would not guess at it.

Mr. FRENCH. Of course, I suppose the dealer would have it weighed.

Gen. CARSON. He presents his bills, but they have to check them up.

Mr. SLEMP. Of course, you could dump the hay off on the scale.

Gen. CARSON. They probably do it in that way.

Mr. SLEMP. You could not do that with coal, and there might be other articles that you could not dump on the present scale.

Gen. CARSON. It could be done, but, of course, it would be very laborious.

CHANGING AERIAL LINE TO CABLE LINE, FORT BAKER, CALIF.

Mr. SLEMP. The next item is for changing the aerial transmission line to a cable line through a tunnel at Fort Baker, Calif., \$3,410.

Gen. CARSON. The present transmission line is constructed across an elevation which rises to about 700 feet above sea level. During almost every high wind one or more breakdowns occur in this line, thus interrupting all light and power service at both Fort Baker and Barry until repairs can be made. This usually takes considerable time and is an arduous task, because breakdowns always occur on top of the hill. The change from an aerial to an underground cable line will eliminate all breakdowns on account of storms and insure continuous service to both of these posts. In addition, it will materially reduce the maintenance expense of this line. The work is to be performed under the supervision of the post electrician at Fort Baker, the entire estimate being for the purchase of the necessary material, with the exception of one item of about \$80 to cover cost of certain labor.

Mr. SLEMP. Would you not use the same line through the tunnel that you are now using?

Gen. CARSON. You could not use the same material; no, sir. We would have to have more or less moisture-proof material going through the tunnel.

Mr. SLEMP. What would you do with the line you have running over the hill; would you throw that away?

Gen. CARSON. No; that would be taken down and probably used around the post for other purposes.

Mr. SLEMP. Why could you not use it by running it through the tunnel?

Gen. CARSON. Because it is not a suitable kind of wire. The line going over the hill is a bare wire, and you would have to use a covered wire going through the tunnel.

Mr. SLEMP. Could you take the wire and cover it?

Gen. CARSON. We have no facilities for doing that.

Mr. SLEMP. How much did you spend on the maintenance of the line going over the hill during the present fiscal year?

Gen. CARSON. I did not bring that data.

Mr. SLEMP. And how many breakdowns did you have during the current fiscal year?

Gen. CARSON. I did not bring that data with me.

WHARF COMPLETION, FORT BAKER, CALIF.

Mr. SLEMP. The next item is for wharf completion, \$6,000.

Gen. CARSON. This is to complete a project that has been approved for some time and it is for the purpose of completing a concrete approach to the existing wharf. The report is that the wharf in question is most important in connection with hay transportation to posts on the north shore. It is in constant use by vessels of the Quartermaster Department and others in furnishing supplies to Forts Baker and Barry. Until these five inshore bays are constructed it will be necessary to continue the use of the present wooden approach. The entire approach to this wharf was formerly of wood and had been in service so long that it was structurally unsound, and because of its condition the Secretary of War approved the expenditure of \$18,000 last year in order that the wooden wharf might be replaced by a sound structure. The five inshore bents which are now being used are considered structurally even more unsound than when the original expenditure was approved. Because of this fact the construction requested herewith is considered urgent. Under date of May 5, 1920, the War Department approved an expenditure of \$18,000 for the construction of a concrete approach to the main wharf at Fort Baker.

Mr. SLEMP. Do you know where they got that money?

Lieut. BRILL. I do not know whether it was carried in this same appropriation for the fiscal year 1920 or whether they got it through an older appropriation. I believe it was this same appropriation for the fiscal year 1920, and I will insert the correct information about that.

NOTE.—This \$18,000 was taken from the appropriation "Roads, walks, wharves, and drainage," fiscal year 1920.

Gen. CARSON. I will have to look that up, because not being here last year I am not familiar with what happened then. The estimate

of \$18,000 for the work had been prepared some time previously, and before prices reached the high level that existed when the work was done. The lowest bid received was \$22,600. In order to keep the amount of the contract within the amount approved by the Secretary of War, it was necessary to eliminate part of the work proposed by omitting the five inshore bays. The cost of the project was brought within \$18,000 and the contract was made on that basis. They now desire the additional \$6,000 to complete the shore approach, which is of wood and part of the old structure. They report it as being structurally weak and it has been condemned. This is one of the many projects that have been under consideration and discussion for maybe a year or more.

Mr. SLEMP. How long has the 59 feet of uncompleted wooden part of the approach been standing there, or how long has it been built?

Gen. CARSON. I suppose since the establishment of the post, probably 15 or 20 years ago. To be more accurate, it was established 21 years ago, and this was practically the wooden wharf that was built. It was probably intended to be of a more or less temporary character. Very frequently at artillery posts the engineers, for use in their construction work, will put in a wooden dock, and then it will be used for post purposes, although it was never intended for that purpose. It would be used for that purpose until something more permanent could replace it. This is probably one of that character.

Lieut. BRILL. I believe the teredo is very active in California waters, and that accounts somewhat for the fact that the wooden piling gives away comparatively quickly.

Mr. SLEMP. Is this wharf used very much?

Gen. CARSON. It is the only means of access to both places, Fort Baker and Fort Barry.

Mr. SLEMP. Do you have any land approach by which to take supplies?

Gen. CARSON. It is a very circuitous one.

Maj. RUHLEN. It is 7 miles across the bay.

Gen. CARSON. He spoke of the land approach.

Maj. RUHLEN. It is 2 miles from the ferry landing.

Gen. CARSON. Suppose you went to the post from the city of San Francisco?

Maj. RUHLEN. You would have to take a ferryboat.

Gen. CARSON. By land?

Maj. RUHLEN. That would be 300 miles.

Gen. CARSON. You would have to go clear around the bay. Our main supply depot, so far as quartermaster's stores are concerned, is located at Fort Mason, in the city proper.

Mr. FRENCH. Is it true that the water here until the last few years was fresh water?

Maj. RUHLEN. It is salt water, because it is right close to the entrance to the Golden Gate.

Mr. FRENCH. We found up at Mare Island that timbers that had been used at a time when it was fresh water were now affected by the salt water. On account of the drawing off of water from the Sacramento for irrigation purposes, the salt water had crept up, and that construction needed to be materially changed from wooden structures to cement on account of the teredo. That came out in

connection with the hearing on the naval bill. This is near the ocean. and I presume it has always been salt water.

Gen. CARSON. Yes, sir. This work is a real necessity.

Mr. SLEMP. Is that the only wharf you have at Fort Baker?

Gen. CARSON. Yes, sir.

OIL-STORAGE HOUSE, FORT BARRANCAS, FLA.

Mr. SLEMP. The next item is for an oil-storage house at Fort Barrancas, Fla., \$2,495. You have a temporary building there now. have you not?

Gen. CARSON. We have none at all. The estimate is based on the proposition to construct a corrugated-iron building, 20 by 40 feet. with concrete floor, fireproof construction.

Mr. SLEMP. How do you get along without that building now?

Gen. CARSON. There is no building available for the storage of oil at this place. One section of the coal bunkers has been used for storing a part of the oil which must be kept on hand. This has a dual disadvantage, in that it provides unsatisfactory storage, with greatly increased fire hazard, and necessitates the piling of coal in the open, resulting in loss due to deterioration. Even with this expedient it is necessary to store a considerable amount of oil in barrels in the open. In the climate at Fort Barrancas it is impossible to prevent the barrels from leaking, sometimes quite badly. The local authorities state that the wastage thus caused in a year's time represents a good percentage of the cost of the proposed oil house. This construction is in accord with the policy of the War Department that, wherever possible, oils should be stored in a separate fireproof building. Therefore, in view of the entire absence of facilities of this nature at Fort Barrancas, this project is recommended for approval.

MARINE RAILWAY, FORT H. G. WRIGHT, N. Y.

Mr. SLEMP. The next item is marine railway, with two skidways and boathouse at Fort H. G. Wright, N. Y., \$29,770.

Gen. CARSON. This is one of the places that I happened to visit since I have been in charge of this service, so I can speak from personal knowledge in regard to that.

Mr. SLEMP. That is very much better. Tell us about the skidways.

Gen. CARSON. It is proposed to construct a boathouse 30 by 45 feet, frame construction, for housing smaller-size artillery boats. together with a marine railway of 150 tons capacity having a skidway on either side, so that an indefinite number of boats may be hauled out of the water at the same time.

There are 13 boats in use at the coast defenses of Long Island Sound, viz, 3 D. B. boats, 5 mine yawls, 1 patrol boat, 2 artillery tugs, and 2 additional boats recently assigned, one of which, the V-2, is 110 feet over all. The marine railway with skidways is desired, so that these boats may be hauled from the water for repairs and overhauling by the Government. Because Fort H. G. Wright is the coast-defense headquarters it has many facilities in workshops and skilled personnel, both officers and enlisted men, which could be

used in this work without additional expense to the Government. The only shops necessary in connection with this project will be one for housing the hoisting motor and one for storing the necessary ships' carpenters' tools, paint, oils, etc. All ordinary carpentry, plumbing, blacksmithing, and machine-shop work can be done in the existing shops, all of which are comparatively near the proposed site for the railway.

Docking facilities for the sort of work which it is proposed to perform at Fort H. G. Wright exist at Greenport and New London. The local authorities state that the New London firm has been so busy that they have refused to bid on work for the larger boats and that the Greenport firm has done very poor work on the smaller boats. They further state that a railway such as is proposed can be built and operated at a decided advantage to the Government.

The construction of this project will be of further advantage to the Government, in that boats can be hauled out for the winter and for lengthy repairs at very little expense to the Government. In this connection it must be borne in mind that during the ordinary winter the harbor at Fort Wright freezes over, thus rendering it necessary to draw these boats out of the water to insure them against damage by ice.

Mr. SLEMP. How are the boats stored now, or where do you keep them now?

Gen. CARSON. They are kept mostly in the water, or the large ones are, or they are sent across to the mainland and stored at local yards on the other side of the Sound. The small boats are hauled up by some means that they have there.

Mr. SLEMP. Is the deterioration of the boats very much greater when kept outside than when kept inside?

Gen. CARSON. In a climate such as that at New London, or at Fort H. G. Wright, the damage done to the boats by keeping them in the water during the winter can not be avoided unless there are some extraordinary means taken to protect them.

Mr. FRENCH. Will this amount complete the project?

Gen. CARSON. We think it will. This is based upon the prices that have been prevailing for some time past, but we hope that they will be less when we get the work under way.

Mr. SLEMP. How much of this money goes for the railway that you speak of?

Gen. CARSON. I have not separated that. This is the total amount required to complete the project. It is principally for the marine railway. The skidways are a comparatively small part of it.

Mr. SLEMP. How much is estimated for the boathouse?

Gen. CARSON. It is a small boathouse, 30 by 48 feet.

Mr. SLEMP. Are the skidways and the marine railway necessary for the operation of the boathouse?

Gen. CARSON. They want the marine railway in order to haul the boats out of the water so as to put them in the boathouse.

Mr. SLEMP. Could you build the boathouse so that that would not be necessary?

Gen. CARSON. Then you would have difficulty in getting the heavy boats out of the water, and they would be limited to such boats as could be hauled out by hand.

Mr. FRENCH. Is there some tide there?

Gen. CARSON. Yes, sir; there is quite a tide, but how many feet it is I can not say. That is located near the celebrated Race Rock Light.

Mr. SLEMP. How many feet is your marine railway?

Gen. CARSON. About 315 feet of track.

Mr. SLEMP. Is it all steel, including the ties?

Gen. CARSON. There is some piling, of course, that must be provided, and there is a cradle that has to be constructed, and all of that is of timber, of course. I think the only steel is in the rails. There are no wheels on the cradle, but it is slid over by friction.

Mr. FRENCH. Does the War Department, as a rule, do its own repairing for such boats as are necessary?

Gen. CARSON. Where it has the facilities, yes, sir; but where it has not, it must do it by a contract with an outside firm. That is the difficulty at this place. They have not those facilities, particularly for taking care of the larger boats, tugs, etc., and they must rely upon shops along the shore on the mainland. They have the sort of difficulties as are described in this note.

Mr. SLEMP. What did you say the cost of the boathouse was?

Gen. CARSON. I have not that separated. I have the total.

Mr. SLEMP. If I understand this item, it does not add anything to the facilities or conveniences of the fort, but simply protects the boats that are there from the weather when not in use?

Gen. CARSON. It does add to the facilities of the post, by giving them facilities which they do not now possess, to enable them to protect this Government property.

Mr. SLEMP. I mean that you are not able to haul any more guns over there or handle any more passengers, but it is simply to preserve these boats.

Gen. CARSON. To more economically take care of them.

Mr. SLEMP. That is the same thing.

Gen. CARSON. Yes, sir.

Mr. SLEMP. Will you put in the record there a statement showing the expense in connection with the repair of damages to those boats during this winter, due to the fact that you did not have this boathouse and marine railroad?

Gen. CARSON. I will do so.

NOTE.—It is impossible to obtain accurate figures as to the amounts expended because of the fact that larger boats must be left in the water all winter and of the amount that would be saved on repairs which could be made by the Government, but which now must be let to private firms. The loss consists mainly in more frequent painting and overhauling than would otherwise be necessary and in shortened life of the boat.

Mr. FRENCH. How far is it from the fort to the place across the bay where you said you would have to have the boats taken in order to protect them from freezing? As I understand it, the waters here are so frozen that the boats are not usable in the wintertime anyway.

Gen. CARSON. Not much; yes, sir.

Mr. SLEMP. How far is it to the place you would carry them?

Gen. CARSON. It would be to Greenport and New London. It is several miles to New London—about 9 miles.

Mr. FRENCH. Are there abundant facilities for taking care of boats there, so that they will not be injured by freezing?

Gen. CARSON. No, sir; I think not.

Mr. SLEMP. Where are those boats now—out in the water?

Gen. CARSON. The large ones are out in the water. The two auxiliary tugs and the 110-foot boat are out in the water, and I presume these distribution boats are also.

INCINERATOR AT FORT MOULTRIE, S. C.

Mr. SLEMP. The next item is \$1,000 for an incinerator at Fort Moultrie, S. C.

Gen. CARSON. That is for the purpose of handling the garbage and waste matter. It is proposed to build an incinerator at this post of size sufficient to handle all garbage and waste matter. This project was first requested on April 19, 1918, at which time the reason for its construction was stated as twofold; first, the contractor who hauled garbage from the post stated that his bid for the work would be increased for the next fiscal year from the existing rate of \$45 per month to \$100 per month, and, second, the surgeon recommended it highly as a necessary sanitary measure. The matter was fully investigated at that time, and found to be of such importance that it was proposed to perform the work at once, and it was so recommended to the Secretary of War. The matter was disapproved by him because of the limited funds available. This project has been revised on several occasions since the original request. Its urgency may be seen from the following quotation from the report of an engineer from the sanitation section who investigated the case in June, 1918:

At present the disposition of the garbage is a serious matter, and, in fact, no actual disposition is being made. Combustible wastes of the reservation are being burned on a dump near the proposed incinerator site and the garbage is being dumped on the ground at one point at the end of a temporary road built by the quartermaster north of the reservation and near the bulkhead line. There is also another garbage dump near Battery Capron on the cove side of the reservation. The garbage is being partially disposed of by buzzards, but it is highly offensive and measures should be taken to provide for the disposal of garbage by cremation. The inspector was informed by the quartermaster that efforts to temporarily dispose of garbage by burial had been tried, but that this means was not satisfactory.

Fort Moultrie has permanent quarters for 523 officers and men and temporary quarters for 1,004 officers and men. It is believed that the present method of disposing of the garbage of this post is utterly unsanitary and should not be allowed to continue. This project is, therefore, presented as one of prime importance, which does not admit of further delay.

RIPRAP BREAKWATER, FORT MORGAN, ALA.

Mr. SLEMP. The next item is \$46,000 for riprap breakwater at Fort Morgan, Ala.

Gen. CARSON. The proposition there is to construct a riprap breakwater so located to the north of the present concrete engineer wharf as to form with that wharf a protected basin in which the small boats belonging to the coast defenses of Mobile may be kept in safety during storms.

This office has had numerous urgent requests for this work, the matter first being taken up in the summer of 1919. On November 17, 1919, the commanding officer of the coast defense of Mobile reported that some sort of protection for small boats was urgently and absolutely needed at Fort Morgan. During the period from October 13 to November 17, 1919, the coast defense commander's launch was seriously damaged while lying at the wharf and was forced to run to Navy Cove for shelter on several occasions to prevent further damage. At the time of making this report, November 17, 1919, the coast defense commander's launch and the D. B. boat were both at Mobile seeking shelter and the post was without a launch of any kind. Even in ordinary weather, the coast defense commander's launch is forced to moor at Navy Cove 4 miles from Fort Morgan without a yawl or other means of communication with the post.

Mr. SLEMP. How many boats have you there?

Gen. CARSON. That I can not answer. I can insert that in the record, if you wish it.

NOTE.—One harbor boat, 140 feet in length; one junior mine planter, 98 feet in length (ordered to Mobile); one D. B. launch, 64 feet (ordered to another station); one gasoline launch, 50 feet; three mine motor yawls, 24 feet; one barge.

Mr. SLEMP. You get along all right now, except in case of storms. Have you had any vessels destroyed there by storms?

Gen. CARSON. Not entirely, but almost. On February 26, 1920, the coast-defense commander, whose headquarters are at Fort Morgan, reported that during the previous 48 hours Mine Yawl No. 204 had broken from its moorings, due to a sudden north wind, and had drifted to the shallow channel south of Mobile Point and had overturned. It required a large detail of men under the personal supervision of the mine commander almost 24 hours to bring this boat back to the post.

Mr. FRENCH. This item appears in the bill for the first time, and I was wondering if any work at all had been done on the breakwater from any other funds?

Gen. CARSON. I do not think so.

Mr. FRENCH. Will this complete the project?

Gen. CARSON. It will complete the breakwater. This is only a part of the plan to give the protection desired in case this is found to be inadequate.

Mr. FRENCH. Will this, then, be a waste of money if it is found to be inadequate?

Gen. CARSON. No, sir; it will be a part of the plan. This is only one part, and there are two or three other features. If this is found to be insufficient—

Mr. FRENCH (interposing). Is it pretty nearly certain not to be sufficient?

Gen. CARSON. We think it will be sufficient.

Mr. FRENCH. What I had in mind was whether we should not consider the whole project, if we consider so large a part of it as \$46,000 would provide. What would be the next project if this \$46,000 project was not found to be sufficient?

Gen. CARSON. I have a description of it here.

Mr. SLEMP. What are the dimensions of the proposed breakwater?

Gen. CARSON. First, if you will let me answer that question—

Mr. SLEMP (interposing). I thought you said you could not answer it.

Gen. CARSON. I have it here; but I want to get it in concise form. This plan is in four parts, the first part being for the riprap breakwater, for which this estimate provides.

Mr. SLEMP. Give the dimensions right there.

Lieut. BRILL. Six feet wide at the top and sloping down to 67 feet wide at the bottom.

Mr. SLEMP. How high?

Lieut. BRILL. It would vary from the outer end to the land. It is not very deep in any place. I think it will be between 13 and 14 feet deep.

Gen. CARSON. It is about 360 feet long, I should say.

Mr. SLEMP. What kind of material will you put in there?

Gen. CARSON. Broken stone.

Mr. SLEMP. Where will you get it?

Gen. CARSON. From that vicinity.

Mr. SLEMP. What is the estimate for the hauling of it?

Gen. CARSON. I have not that figure with me. I did not bring the detailed estimates with me.

Mr. FRENCH. Do you think this estimate is sufficient to complete it, or do you believe it will be built for this amount?

Gen. CARSON. I believe it is sufficient.

Mr. FRENCH. If it is not sufficient to afford the protection, then you have a second project, of which this is a necessary part?

Gen. CARSON. In case it should not be sufficient we would then have to connect it with the shore line.

Mr. FRENCH. What would be the cost of that additional work?

Gen. CARSON. That would be for continuing the breakwater to the wharf so as to close that side of this refuge basin. I have not the figures on that now, and I doubt if we have a detailed study of that. That means extending this point here into the shore line, making an inclosed basin with an entrance through here [indicating] by putting an additional riprap in here [indicating].

Mr. FRENCH. What is the distance on the second part of the project?

Gen. CARSON. About 340 feet.

Mr. FRENCH. It is about the same length as this [indicating].

Gen. CARSON. Yes, sir. Here is another one: If that does not accomplish the purpose, we would have to have a similar arrangement on the side of the wharf here for about 240 feet.

Mr. FRENCH. Before taking up the third project, state what is the depth of the water on the second part.

Lieut. BRILL. It is very shallow.

Mr. FRENCH. About the same as in the first project?

Lieut. BRILL. No, sir; it is much less. It is a mud flat extended out. The only thing necessary is to connect the breakwater with the shore line, and that can be made by dumping in mud and dirt.

Mr. FRENCH. The second part of the project, if it proved necessary, would not be as expensive as the first part?

Lieut. BRILL. It would be less than half, probably. It does not require riprap construction, but simply requires the dumping of material in there.

Mr. SLEMP. Do you know of any other instances besides that one yawl that broke loose where vessels were damaged?

Gen. CARSON. During the period from October 13 to November 17, 1919, as stated here, the coast-defense commander's launch was seriously injured and at the time of this report the commander's launch and the D. B. boat were at Mobile seeking shelter, and the post was without a launch of any kind.

BOATHOUSES, FORT M'KINLEY AND FORT PREBLE, ME.

Mr. SLEMP. The next item is \$9,000 for a boathouse at Fort McKinley, Me.

Have you any boathouses there now?

Gen. CARSON. As I recall it, only for small boats—rowboats. The proposed boathouse at Fort McKinley is of sufficient size to house the launch L-47. That launch is 60 feet long.

Mr. SLEMP. Where is that?

Gen. CARSON. At Fort McKinley, in Portland Harbor. The construction of this boathouse was originally requested in November, 1919. This boat was assigned to these coast defenses originally in August, 1918. The experience of the local authorities during the ensuing winter demonstrated that it would be necessary to house this boat if it was to be kept in a satisfactory and serviceable condition. At the present time it is necessary to moor this boat at the wharf, where it is exposed to the wave action and all southerly winds.

Mr. SLEMP. The upkeep of these boats, the supply of gasoline, and the running operation of the boats, are paid for out of the Quartermaster's supplies of the Army?

Gen. CARSON. Yes, sir.

Mr. SLEMP. That item was cut down quite materially in the Army bill this year, and that will, perhaps, require a redistribution of these various boats and possibly the laying up of a number of them. Has that been taken into consideration in this estimate?

Gen. CARSON. Yes, sir. You refer to the reduction in the regular supplies?

Mr. SLEMP. Not in the reduction of the estimate, but in the appropriation.

Gen. CARSON. This is under transportation of the Army.

Mr. SLEMP. That has been changed quite materially?

Lieut. BRILL. These boats are for mine-laying purposes almost entirely, and I think they would be the last ones affected.

Mr. SLEMP. I think that you could lay them up somewhere for a long time.

Gen. CARSON. That is up to the Chief of Coast Artillery.

Mr. SLEMP. Please put in the record the character of construction of the two boathouses.

Gen. CARSON. Yes, sir.

Mr. FRENCH. Could you contrast the two boathouses, the one at Fort McKinley and the other at Fort Preble from the standpoint of the number of boats accommodated and the elements that enter into the difference in the cost of one and the other?

Gen. CARSON. Yes, sir.

NOTE.—Both boathouses are to be of frame construction, the one at Fort McKinley is for one boat, the one at Fort Preble for two.

INSTALLING HEATING SYSTEM, FORT PREBLE, ME.

Mr. SLEMP. You are asking \$3,500 at Fort Preble, Me., for installing heating system, supply office and commissary building?

Gen. CARSON. Fort Preble, Me., installation of heating system in supply office and commissary, \$3,500, located in building No. 9. At present this building is heated with stoves. Considerable difficulty is experienced during periods of extremely cold weather in attempting to maintain sufficient heat in this building to prevent the freezing of vegetables and other perishable supplies carried in the commissary.

Mr. SLEMP. Have there been any complaints there this winter?

Gen. CARSON. There have been a number of complaints in the past, but probably they have not had any very severe weather this winter. Of course, this estimate was prepared last fall, but it is based on the experience of preceding winters.

INSTALLATION OF TOILET FACILITIES, FORT PREBLE, ME.

Mr. SLEMP. Then you have submitted an item for installation of toilet, supply office?

Gen. CARSON. That is also in building No. 9, which is at present without toilet facilities. Men work there in connection with the care and issue of supplies, and this small amount, \$125, is requested to provide these facilities for the employees and other personnel who spend a large part of the day working in the building.

The laundry tubs are requested for barracks Nos. 25 and 27. These tubs are required for washing fatigue clothes and other articles which are not sent to the Portland laundries. There are no facilities of this nature in these buildings and their installation is necessary in order that the men may be able to properly care for the clothing issued to them.

OIL-STORAGE TANK, FORT WINFIELD SCOTT, CALIF.

Mr. SLEMP. The next item is, "For oil-storage tank at Fort Winfield Scott," and you also estimate for an incinerator there?

Gen. CARSON. It is proposed to construct an incinerator 6 feet 2 inches by 10 feet 3 inches. All the ironwork for this building is now on hand, the estimate being only for labor and for the necessary concrete material and bricks. There is no place on the post at present which can be used for the incineration of refuse. The construction of this building is considered a sanitary necessity by the post health officer. The estimated cost is \$414.

Mr. SLEMP. Now, about the oil-storage tank?

Gen. CARSON. It is proposed to place a coating of reinforced concrete 6 inches thick on the outside of the existing concrete oil-storage tank. This tank has a capacity of 422,000 gallons of oil. Due to its bad condition there is a great loss of oil from the tank by leakage. Various attempts to remedy this condition have shown that the only manner in which this tank may be permanently repaired is by placing a reinforced-concrete coating over the entire outside. The amount requested is for labor and material both. The project is necessary from an economical standpoint in order that further loss of oil through leakage may be prevented.

Mr. SLEMP. How much oil did they lose there this year, do you know?

Gen. CARSON. I will have to send this information to the committee at a later date.

OIL-STORAGE TANKS, FORT WORDEN, WASH.

Mr. SLEMP. The next item is, "Storage tanks for oil, Fort Worden, Wash."

Gen. CARSON. Those are metal tanks for small quantities.

Mr. SLEMP. You seem to get along with a tank to cost only \$510 at Fort Worden, but when you get to Fort Winfield Scott you want \$3,300?

Gen. CARSON. The difference is in the amount of oil carried. The tank installed at Fort Winfield Scott carries 422,000 gallons of oil, and probably is more or less the supply for the entire harbor, I can not say offhand. At Fort Worden they have no facilities whatever for the storage of oil. The oil is shipped to the post in steel drums which are supposed to be emptied promptly upon their receipt and returned to the sender. There is a great deal of dissatisfaction caused by the delay in the return of drums at that post.

Mr. SLEMP. In regard to the new language in the item, you ask that not to exceed the following amounts may be used in the erection and completion of the projects indicated at the places named: \$29,770 for a boathouse with marine railway with two skidways at Fort H. G. Wright, N. Y., and \$46,000 for a riprap breakwater at Fort Morgan, Ala. Is the necessity of the new language due to the fact that it exceeds the authorized amount?

Gen. CARSON. The statutory restriction on permanent structures to cost more than \$20,000, without special authority of Congress.

Mr. SLEMP. Please put into the record an itemized statement of the \$75,000 class A items in this \$125,000?

Gen. CARSON. Yes, sir.

Class A items included in "Barracks and quarters, seacoast defenses, 1922."

Post.	Project.	Amount.
Revere, Mass.....	Installing ARCO steam heating plant (boiler) including radiators and piping, building No. 5. (2 H. S.)	\$465
Levett, Me.....	Construction of well shelter, reinforced concrete base of....	400
Do.....	Installing Fairbanks-Morse type D power pump, including piping from well to reservoir.	264
Fort Baker, Calif.....	Scale, truck capacity 10 to 15 tons, platform 20 feet or none, and installing.	750
Do.....	Change aerial line to cable line through tunnel.....	3,410
Do.....	Wharf completion.....	6,000
Fort Barrancas, Fla.....	Oil storage house, 20 by 40 feet, concrete pit and permanent building.	2,465
Fort H. G. Wright, N. Y.....	Marine railway with 2 skidways and boathouse.....	29,770
Fort Moultrie, S. C.....	Incinerator.....	1,000
Fort McKinley, Me.....	Boathouse.....	9,000
Fort Preble, Me.....	do.....	16,910
Do.....	Installing heating system supply office and commissary building No. 9.	3,500
Do.....	Installation of toilet, supply office, building No. 9.....	125
Do.....	Installation 2 laundry earthen set tubs, each, buildings 25 and 27, company barracks.	650
Fort Winfield Scott, Calif.....	Placing 6-inch reinforced concrete on outside concrete oil storage tank, prevent breakage.	3,335
Do.....	Incinerator.....	414
Fort Worden, Wash.....	Storage tanks for oil.....	511
Total.....		125,000

BARRACKS AND QUARTERS, SEACOAST ARTILLERY, PHILIPPINE AND HAWAIIAN ISLANDS.

Mr. SLEMP. The next item is barracks and quarters, insular possessions, \$100 for the Philippine Islands and \$246,000 for the Hawaiian Islands. You had \$108,300 last year?

Gen. CARSON. Yes, sir.

Mr. SLEMP. How did you spend the money you had last year?

Lieut. BRILL. An addition to the quartermaster storehouse at Fort Ruger, Hawaiian Islands, \$6,200, which, I think, takes care of the total amount for the Hawaiian Islands. In the Philippine Islands there was a salt-water system for toilet purposes and for fire protection, \$100,600.

Mr. SLEMP. Is that completed?

Lieut. BRILL. The planes are under way. It has not been completed as yet.

Mr. SLEMP. Does the money hang over for another year for that item?

Lieut. BRILL. No, sir; I do not believe it does. I think we will have to get that completed by next June to use that money. Then, there is a concrete tank for storage of fresh water for the power house—for the boilers, which have to have good fresh water—\$1,500. That makes a total of \$102,100 for the Philippine Islands, which is the amount appropriated.

Col. SMITH. That entire amount has been allotted.

Mr. SLEMP. For the next fiscal year you ask \$246,000 for the Hawaiian Islands.

Gen. CARSON. They desire a change made in that, sir. For the Hawaiian Islands they want merely \$100 and for the Philippine Islands they want the estimate increased to \$333,100.

Mr. SLEMP. That is quite a change in the attitude of the department. When was that made?

Lieut. BRILL. That was made in the conference at the War Department January 11.

Mr. SLEMP. You propose now to withdraw the suggestion that you originally submitted, of \$246,000 for the Hawaiian Islands, and to ask for \$333,000 for the Philippine Islands?

Gen. CARSON. Yes, sir. We have been delegated to present those figures, based on a report made to the Chief of Staff.

Mr. SLEMP. We have no official estimate submitted to the committee for that; we have for the Hawaiian Islands. Was the original estimate of \$246,000 for the Hawaiian Islands and the somewhat informal supplemental proposition of \$333,000 for the Philippine Islands based upon a larger number of men being sent to the Hawaiian Islands and the Philippine Islands, respectively, than are there now?

Gen. CARSON. Yes, sir.

Mr. SLEMP. What is the proposition, respectively, as to the Hawaiian and Philippine Islands in regard to the number of men to be sent there?

Gen. CARSON. As to the number of men to be sent to Hawaii and the Philippine Islands, I think the contemplated Coast Artillery garrison in the Hawaiian Islands is something like 110 officers and 3,320 enlisted men.

Mr. SLEMP. You have that number now?

Gen. CARSON. No, sir; that is the garrison proposed under the Army reorganization act.

Mr. SLEMP. How many have you there now?

Gen. CARSON. At present we have 23 officers—I am referring now to Coast Artillery—and about 1,600 enlisted men.

Mr. SLEMP. Have you enough men there to properly man the batteries as they now exist?

Gen. CARSON. You are getting outside of my province; that is for the Coast Artillery.

Maj. RUHLEN. The defenses are manned.

Mr. SLEMP. Is this the distribution corresponding to an Army of 280,000, 175,000, or 150,000 men?

Maj. RUHLEN. A distribution of the Army in accordance with the act of last year—June 3—280,000 men.

Mr. FRENCH. That is the \$333,000 item?

Lieut. BRILL. No, sir. The allotment for Hawaii of \$246,000 is based upon the increased strength of officers and men to be sent there under the reorganization act, while the \$333,000 for the Philippines is not based upon any additional number of men to be sent there, but upon storage facilities for ammunition and guns which are either there or en route. Hawaii is based on the increased strength of men, and the Philippines for protecting material and ammunition.

Mr. FRENCH. How many men under the Coast Artillery are now in the Hawaiian Islands and how many will be there under the proposed plan?

Gen. CARSON. Those are the figures which we have just given. Seventy-three officers and 1,690 men of the Coast Artillery are now stationed in the Hawaiian Islands, plus officers and men of the staff corps, making a total of 41 officers and 1,906 men.

Mr. FRENCH. And the Philippine Islands?

Gen. CARSON. I did not bring that, sir, because there was no project up in connection with housing.

Mr. FRENCH. Were both of these propositions before the Secretary at the time he made the original recommendations?

Lieut. BRILL. The Philippine Islands plan was not in shape to present. It was presented to him in October, I think.

Gen. CARSON. The Philippine project, as Lieut. Brill states, is entirely a storage project at Fort Mills, Corregidor. There is no housing in that. Buildings for the storage of ammunition, artillery tractors, munition trucks, for which they have no storage at all.

CURRENT EXPENDITURES.

Mr. ANTHONY. Did you spend the money which you had for the Philippine Islands last year?

Gen. CARSON. Yes, sir.

Mr. ANTHONY. What for?

Lieut. BRILL. I have put that in the record. A salt water system for toilet and fire protection purposes, \$100,600, at Fort Mills, concrete storage plant for fresh water for the power house, the boilers. \$1,500.

Mr. ANTHONY. Where is Fort Mills?

Gen. CARSON. On Corregidor Island. I spent three years there in construction work, so I am pretty familiar with it.

Mr. ANTHONY. Where is Fort Kamehameha, in the Hawaiian Islands at Pearl Island?

Gen. CARSON. It is one of the defenses of Pearl Harbor, but it is on the mainland.

Mr. ANTHONY. How many barracks have we there now?

Gen. CARSON. Kamehameha garrison consists of 10 officers and 1,028 men. We have accommodations there for that many.

Mr. ANTHONY. How many guns have you there, do you know?

Gen. CARSON. No, sir; I am not a Coast Artillery expert, and I can not answer that offhand. I think that appeared in the testimony yesterday afternoon by Gen. Coe; I think some questions were asked about that.

Mr. ANTHONY. Major, do you know how many guns there are at Fort Kamehameha?

Maj. RUHLEN. Three-inch, 6-inch, and 12-inch guns and 12-inch mortars.

Mr. ANTHONY. They have eight hundred and some odd men stationed there now; what is the need of more men at that place?

Maj. RUHLEN. Additional men are for the purpose of manning the new battery, which has recently been completed, the long-range 12-inch guns, and also for the antiaircraft batteries located at that place.

Mr. ANTHONY. How far along have they gotten with the construction of the dry dock?

Maj. RUHLEN. I think it is completed; I do not know. My own opinion is that it was nearly completed when I left there, three years ago.

Mr. ANTHONY. A few years ago they were having a good deal of trouble with the construction of the dock.

Gen. CARSON. The Navy dry dock?

Mr. ANTHONY. Yes, sir.

Maj. RUHLEN. I think they have successfully completed the dock or met the difficulty.

Mr. ANTHONY. Is it in use now?

Maj. RUHLEN. I can not say. I will endeavor to ascertain and put it in the record.

Mr. ANTHONY. Of course, these fortifications are intended to protect the naval facilities there, and I was just wondering how far along the Navy was with its work.

Gen. CARSON. I think the dock has been finished and is in use. I have not seen anything of it lately, but I think, unless my memory is very much at fault, that the Secretary of the Navy a year ago visited Honolulu for the purpose of opening that dock.

Mr. SLEMP. If you have anything further to suggest, General, you may place it in the record.

Gen. CARSON. Yes, sir; I will probably insert the whole thing.

MEMORANDUM.

FORT MILLS, P. I.

Buildings for ammunition storage as follows:

3 buildings, 48 by 108 by 14 feet clear, for caliber .30 ammunition..	\$58,500
17 buildings, 32 by 96 by 10 feet, for miscellaneous ammunition----	255,000
1 building, 35 by 30 feet, for six 5-T artillery tractors-----	2,800
3 buildings, 25 by 45 feet, for storing twelve 10-T artillery tractors.	9,000
2 buildings, 25 by 60 feet, for storing twelve 3-T ammunition trucks.	7,800
	<hr/> 333,100

The buildings for storing caliber .30 ammunition to have concrete walls and floor with wooden roof framing.

The buildings for storing miscellaneous ammunition to be concrete floored with wood frame roof and tile walls, 3-ply roofing on gypsum slab.

The buildings for storing 5-ton and 10-ton artillery tractors to be of wooden frame with galvanized-iron sheathing and floors of rock, bed covered with crushed stone, sides open, covered by sliding doors.

The buildings for storing 3-ton ammunition trucks to be wooden frame with galvanized-iron sheathing with cement floors, one side open, covered with sliding doors.

1. The condition of the available storage space in the Philippine Islands as given in eleventh indorsement, Headquarters Philippine Department, Manila, P. I., dated April 12, 1920, is as follows:

"All available permanent and temporary buildings or sheds on the port area Manila, Manila Arsenal, Fort Mills, Camp Stotsenburg, and Fort William McKinley for temporary storage, particularly for ammunition, are being used to their maximum capacity. In addition, field guns, limbers, machine-gun carriages, and like material are now in open storage owing to the lack of sufficient covered storage space."

Since this indorsement was written additional ammunition and guns have arrived at the Philippine Department or are now en route there, which will very greatly increase the amount of such material being stored in the open. It is estimated that there will ultimately be required 41 buildings to provide the necessary additional storage space for ammunition and artillery equipment which, until those buildings are provided, will have to be stored in the open. The local authorities report that it is essential to provide cover for all material of this nature, as without it the loss through exposure to heat and rain is very great; in fact, they state that it would "probably be great enough to pay for the building project several times."

2. It is proposed to construct buildings for only the most necessary part of the entire project at this time, consequently no mention is made in this memorandum of the 15 buildings required for the storage of artillery guns and howitzers, because it is believed that this class of material will deteriorate less in open storage than that for which storage facilities are requested herewith.

2. The following is the order of priority of the projects listed in the heading, the most important being listed first:

Seventeen buildings for storing miscellaneous ammunition.

Three buildings for storing caliber .30 ammunition.

Six buildings for housing artillery tractors and ammunition trucks.

The necessity for increased facilities for the storage of ammunition is extremely urgent. Every available cubic foot of storage space is now being utilized for the storage of ammunition. This includes not only space intended for that purpose but Infantry bombproofs which were constructed for shelter of troops. It is not believed advisable to furnish any information as to the quantity and calibers of ammunition; however the provision of this increased storage space is, as mentioned above, considered of utmost importance. It is a project which should be authorized at once and not be longer delayed.

MEMORANDUM.

Coast defenses of Oahu, Hawaiian Territory.

1 field officer's quarters.....	\$12,000
9 company officers's quarters.....	90,000
8 noncommissioned officers's quarters.....	44,000
2 one-company barracks.....	100,000
Total.....	246,000

1. In carrying out the provisions of the Army reorganization act approved June 4, 1920, it has been necessary to make some very considerable changes in the allocation of troops to the various coast defense stations. The authorized strength of the Coast Artillery Corps under this act has therefore been distributed to various coast defenses in accordance with the importance of the harbor to be protected. Under the plan which has finally been determined upon the Coast Artillery personnel assigned to the coast defenses of Oahu is 110 officers and 3,320 enlisted men. In addition to this personnel, at least 10 officers and 180 enlisted men of other services will be assigned to these coast defenses, making a grand total of 120 officers and 3,500 enlisted men.

2. There are at present permanent quarters available in the various posts of the coast defenses of Oahu for 66 officers and 2,227 enlisted men distributed as follows:

Post.	Officers' quarters.		Enlisted men.	
	Field.	Company.	Barracks.	Noncom- missioned officers.
Kamahameha.....	4	32	936	24
De Russy.....	1	9	414	9
Ruger.....	2	14	616	15
Armstrong.....		4	210	3
Total.....	7	59	2,176	51

No temporary quarters were constructed in these coast defenses during the war. By comparing the total personnel to be assigned these defenses with the present quarters available it will seem that quarters will be needed for the following personnel—54 officers, 1,273 enlisted men.

These quarters are to be distributed as follows: Field officers' quarters, 7; company officers' quarters, 47; N. C. O. quarters, 29; enlisted men's barracks, 1,244.

3. It is not expected that it will be possible to assign to these defenses the total number which has been determined as the final garrison at once. The increase will be spread over a period of several years. However, because of present conditions it is earnestly desired to assign approximately one-fifth of the increased number of officers and enlisted men at the earliest possible moment. In order that this may be done it is necessary that accommodations for these troops be constructed. The buildings requested herewith are to provide these accommodations. The exact post at which these troops will be assigned has not as yet been determined; therefore, it is impossible to say at which post the construction is to be undertaken. This project is presented as one of considerable importance because of the urgent desire to station some additional troops at these coast defenses.

4. The present garrison of these coast defenses is :

	Officers.	Enlisted men.
COAST ARTILLERY TROOPS.		
Fort Kamehameha.....	10	828
Fort De Russy.....	3	194
Fort Ruger.....	8	542
Fort Armstrong.....	2	126
STAFF CORPS, ALL POSTS.		
Staff.....	10	12
Medical Department.....	1	26
Quartermaster Corps.....	6	133
Ordnance Department.....	1	43
Total.....	41	1,906

BARRACKS AND QUARTERS, PANAMA CANAL.

Mr. SLEMP. General, your item for Panama is \$774,679, with a change in language. You had \$40,000 last year and only estimated for \$96,500. Please explain the proposition which you wish to present?

DETAILS OF ESTIMATE.

Gen. CARSON. That can be reduced to \$230,200, and is made up of the following items:

- Manure pit at Port Amador, \$1,200;
- Concrete storehouse, 62 by 154 feet, \$60,000.

Mr. ANTHONY. Where is that?

Gen. CARSON. At the same place. All of the items I am reading are for Fort Amador. One coal shed, concrete, 35 feet by 100 feet. \$18,000; replacing road in rear of barracks, a concrete road covered with asphalt, \$22,500. At Fort De Lesseps, administration building, reinforced concrete, two stories, 58 feet by 154 feet, \$65,000. Fort Sherman, coal shed, with elevated track, \$18,500. Construction of railway bridge across Arenal River, \$45,000. That is also at Fort Sherman.

Mr. ANTHONY. Why a railroad bridge?

Gen. CARSON. To replace a wooden structure that is going to pieces.

Mr. ANTHONY. Is that a military spur?

Gen. CARSON. Yes, sir. It is proposed to construct a concrete box culvert and fill across the Arenal River for the railroad from Fort Sherman to the Chagres River batteries. The cost of this construction and fill is estimated at \$45,000. The amount of work required is approximately 800 cubic yards of excavation, 10,000 cubic yards of fill, and 1,300 cubic yards of reinforced concrete. The present bridge for this railroad was hastily built of such old material as was available in connection with the construction of the Chagres River batteries and was intended to be a temporary means of transporting construction materials, laborers, etc., to the site of the work. No attempt was made to construct a permanent roadbed, and the only funds available were those appropriated for the battery construction. The expenditures on the railroad, therefore, had to be kept at the minimum that would accomplish its immediate purpose.

Mr. ANTHONY. When was the trestle built?

Lieut. BRILL. About three years ago; it was built when the batteries were originally built.

Gen. CARSON. I think Fort Sherman was built more than three years ago, and I will have to insert the exact year.

Maj. RUHLEN. But these are new batteries that were built there recently.

Mr. FRENCH. This bridge, then, was built about three years ago?

Maj. RUHLEN. Yes, sir.

Mr. FRENCH. Would not a bridge last much longer than that?

Gen. CARSON. It would depend upon the material used in building it and the amount of use to which it has been put. The report is that it was hastily built of such old material as was available in connection with the construction of the Chagres River batteries and was intended to be a temporary means of transporting construction material, laborers, etc., to the site of the work. It is like the scaffolding around a building.

Mr. SLEMP. No part of the \$230,000 is for quarters or barracks for the troops, as I understand.

Gen. CARSON. I think that is correct.

Mr. SLEMP. Are your sea-coast troops there well housed?

Gen. CARSON. Yes, sir; they are, as far as I know; and the appropriation is only for the projects of which I have given a list.

Mr. SLEMP. You have storage facilities there now which you wish to replace with concrete storage facilities, or are they new facilities?

Gen. CARSON. At Fort Amador, for example, there is need of adequate storehouse facilities. The building now in use for that purpose was originally designed for a combination storehouse and barracks. The quartermaster detachment, through necessity, is scattered among the various companies of the post, a most unsatisfactory arrangement.

Mr. SLEMP. You wish, then, to convert that into barracks exclusively and get other storage facilities?

Gen. CARSON. Use it for its original purpose and build this storehouse.

Mr. SLEMP. You have been able to get along up to date with this combination use?

Gen. CARSON. Yes; they have been existing up to date.

Mr. SLEMP. Give an explanation for the necessity of the other storage items.

Gen. CARSON. A coal shed at Fort Amador. The lack of proper facilities for storing coal was mentioned as a deficiency of this post in the last general inspection. At present coal must be purchased in small quantities and kept in cars or piled in the open, because there is no suitable place for storing it, in both cases being exposed to the weather. This results in a very high percentage of deterioration, which varies from 2 per cent to 10 per cent in proportion to the size of the pile.

Mr. SLEMP. How much do you ask for that?

Gen. CARSON. \$18,000.

Mr. SLEMP. Have all the other places coal-storage facilities, or have you just one general coal supply?

Gen. CARSON. This is the only one.

Mr. FRENCH. You are asking the same at Fort Sherman, are you not?

Gen. CARSON. Yes, sir; a coal shed with an elevated track. At Fort Sherman it is proposed to build a coal shed having a capacity of 1,000 tons, together with an elevated track, so that coal may be dumped directly from the cars into the shed.

Mr. SLEMP. Does not the Government maintain coal stations on the Canal Zone out of other appropriations which are for general use?

Gen. CARSON. So far as I know, the only coal stations maintained are for the canal and for the ships that go through the canal.

Mr. ANTHONY. For what purpose do you use coal at Fort Sherman?

Gen. CARSON. For power purposes and probably for some cooking purposes.

Mr. ANTHONY. Do you make your own light there?

Gen. CARSON. No, sir; we get all the electric current from the canal power supply.

Mr. ANTHONY. Do you use any considerable amount of coal at Fort Sherman?

Gen. CARSON. They want a storage capacity of 1,000 tons.

Mr. ANTHONY. Although they get all of their power and light from the central station?

Gen. CARSON. Well, they have their own individual operating plants in connection with their guns, as I understand it. The report we get is that Fort Sherman is a post of considerable size and uses a considerable volume of coal annually. The exact amount is not known, but it is believed that the storage capacity of 1,000 tons requested is sufficient for the ordinary requirements.

Mr. SLEMP. What other general items have you?

Mr. FRENCH. There is the road item at Fort Amador, which calls for \$22,500.

Mr. SLEMP. I think we had that before the committee last year.

Gen. CARSON. It is proposed to replace the present road in the rear of the present barracks by a concrete road covered with asphalt. This road is approximately two-thirds of a mile long. The present road is of Tarvia B. Because of the continuous high temperature and heavy rains during eight or nine months of the year, this type of road does not wear at all well. Especially since the use of heavy trucks has become a matter of daily routine, it has been found that this type of road gives out rapidly. The result of the wear and tear of the combination of climate and heavy trucks has made the road in question almost impassable.

Mr. SLEMP. Do you know what you spent on this road during the present fiscal year for maintenance and repair?

Gen. CARSON. No, sir; I do not.

Mr. ANTHONY. I would like to get a little information about how the troops are housed on the Canal Zone now. Are they housed in modern barracks or temporary structures?

Gen. CARSON. In both ways. At the Artillery posts I think they are housed in permanent construction, and at the two Infantry posts, the mobile army posts, Forts Clayton and Davis, they have recently completed accommodations at each place for a regiment of Infantry.

Mr. ANTHONY. Of modern construction?

Gen. CARSON. Reinforced concrete construction. I said completed, but they have not entirely completed the plan. I think as far as the buildings are concerned, all but the commanding officer's quarters were finished, and of the buildings that were turned over there were some items omitted. You understand that all construction on the Panama Canal Zone is done by the canal authorities?

Mr. ANTHONY. That is, all barracks and quarters?

Gen. CARSON. Yes, sir; we have not a thing to do with it.

Mr. ANTHONY. Although it is Army property and appropriations are made for the Army?

Gen. CARSON. Yes, sir.

Mr. ANTHONY. Can they build cheaper than you could build, General?

Gen. CARSON. Well, we do not think so.

Mr. SLEMP. That has been an old controversial point.

Gen. CARSON. And judging by the reports that come in I rather think we could do it better if we were allowed to do it in the usual way. The canal authorities tack on about 25 per cent.

Mr. SLEMP. Ten per cent, is it not?

Gen. CARSON. No; they tack on 25 per cent. The canal tacks on 10 per cent as a first item, and then the division under whose direction the work is done tacks on 15 per cent for its overhead, so that we get about 25 per cent charged to us for canal administration and the cost of the work.

Mr. SLEMP. Does not some of that revert to the Treasury in some way; that 10 or 25 per cent?

Gen. CARSON. No, sir; that is expended by the canal in the cost of operation; it helps the canal treasury in making its showing at the end of the year in the cost of operation, but the War Department helps it to take care of its work.

Mr. ANTHONY. Have you been down there recently?

Gen. CARSON. Not since 1906 or 1907.

Mr. ANTHONY. Has your department constructed any buildings of similar nature to those that have been constructed at these two posts, so that you can compare the costs?

Gen. CARSON. We have built reinforced concrete quarters and barracks in the Philippines.

Mr. ANTHONY. Of course, the labor cost would be cheaper in the Philippines?

Gen. CARSON. Yes, sir; it is much cheaper.

Mr. ANTHONY. It is a matter of policy for the War Department to determine who shall build them after they get the money appropriated, is it not?

Gen. CARSON. Yes, sir.

Mr. SLEMP. Last year we carried this item in the bill:

The governor of the Panama Canal, so far as the expenditure of appropriations contained in this act may be under his direction, shall purchase needed materials, supplies, and equipment from available surplus stocks of the War Department.

And you ask to have that stricken out this year. Why is that?

Gen. CARSON. We had nothing to do with that, sir.

Mr. SLEMP. You do not see any reason for its being stricken out, do you?

Gen. CARSON. The only reason I could think of would be that there will probably be no surplus stocks next year. The canal authorities themselves may have asked to have it stricken out.

Mr. ANTHONY. In connection with the questions I asked you a while ago, will you put in the record the number of barracks and the number of men they will house, as well as the number of officers' quarters and the number of officers they will house—I mean, of modern construction—so that we may get an idea as to the number of men the existing modern quarters will care for?

Gen. CARSON. Very well.

Panama Canal Zone—Capacity of modern permanent buildings.

Post.	Capacity.		
	Officers.	Non-commissioned officers.	Men.
Clayton, Fort, C. Z.....	54	24	1,992
Davis, Fort, C. Z.....	54	24	1,992
Quarry Heights, C. Z., R. A.....	13	.....	353
Amador, Fort, C. Z.....	12	9	260
De Lesseps, Fort, C. Z., C. A.....	8	14	119
Grant, Fort, C. Z., C. A.....	31	20	1,250
Randolph, Fort, C. Z., C. A.....	22	8	440
Sherman, Fort, C. Z., C. A.....	34	10	650

¹ These figures are approximately correct.

Mr. FRENCH. Then the item of \$65,000 at Fort De Lesseps, I think should be developed further.

Gen. CARSON. That covers the construction of an administration building 58 feet by 154 feet of reinforced concrete, two stories high. The present post supply officer, transportation officer, utilities officer, and finance officer are using an old wooden building off the reservation for offices. The post exchange is also located in this building, which building was formerly used by the Mexican Legation and may have to be vacated by the Government at any time. There is no space whatever inside the post which could be used for offices for these officers. The only available office space, which is in building No. 6 is used by the coast defense commander and his staff and the post commander. Fort De Lesseps is the coast defense headquarters, coast defenses of Cristobal, and therefore requires much more office space than the ordinary post. It is proposed to construct a building which will provide space for all administrative officers and the post exchange on its first floor, together with offices for the dental surgeon and the post surgeon. The remainder of the building, namely, the basement and the second floor, are to be used for recreation and school purposes, while the basement will be used for bowling alleys, etc.

Mr. FRENCH. The building proposed, then, is to take the place of not only the quarters where the officers to be housed in it are now located, but to furnish additional facilities along recreational lines, and also accommodations for other offices?

Gen. CARSON. Yes, sir; it is to provide accommodations for offices that are now outside the limits of the post, apparently in a wooden building which the Government does not own and which they expect

they will have to give up, and additional accommodations for recreational facilities which do not now exist. The local authorities earnestly request that, for the best interests of the service, a room which could be used for movies, lectures, dances, and for assembly purposes be provided. During the rainy season of about eight months each year the men are absolutely without recreational facilities.

Mr. FRENCH. Do you know how many men are at this fort?

Gen. CARSON. Twenty officers and 125 men.

Mr. FRENCH. And are the accommodations asked for similar to those that exist and are provided at similar posts?

Gen. CARSON. In the zone, yes. These estimates and plans are really prepared in the office of the Governor of the Canal Zone and forwarded to us from there; we did not make them up.

Mr. FRENCH. I was wondering whether anything was being asked that is outside of the policy that has been followed elsewhere.

Gen. CARSON. No, sir.

Mr. SLEMP. Is there anything else you wish to say, General?

Gen. CARSON. No; I think we have covered everything.

THURSDAY, FEBRUARY 10, 1921.

AIR SERVICE.

STATEMENT OF BRIG. GEN. WILLIAM MITCHELL, ASSISTANT CHIEF OF THE AIR SERVICE.

SEACOAST-DEFENSE AVIATION STATIONS.

Mr. SLEMP. General, you have an item for seacoast-defense aviation stations, for which you are asking \$596,725. Last year you presented to the committee a request for \$31,684,914 for similar stations; that request included not only the purchase of the lands but the construction of the various aviation facilities on those lands, but that was not allowed by the committee. This year your request is simply for the purchase of the lands at the stations set out—Portland Harbor, Me., Boston, Narragansett Bay, Long Island Sound, and Puget Sound.

Gen. MITCHELL. That is correct; yes, sir.

Mr. SLEMP. The total amount for these five stations will be \$596,725.

Gen. MITCHELL. That is correct, sir. I ask permission of the committee to insert the general statement which had been prepared by Gen. Menoher at this place in the record.

PREPARED STATEMENT BY MAJ. GEN. C. T. MENOHER.

NOTES ON ESTIMATES FOR FISCAL YEAR 1922, FORTIFICATIONS BILL, AIR SERVICE.

1. Air Service activities at the following places are concerned:

AERIAL COAST DEFENSES.

Continental United States, the purchase of sites for 5 aerial coast-defense stations-----	\$596, 725
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Insular possessions:

Hawaiian Islands, the completion of existing stations-----	\$963, 000
Philippine Islands,-completion of existing station on Corregidor and establishment of a new station near Paranaque, Luzon-----	1, 078, 700
Panama Canal Zone, completion of existing station at France Field and of balloon base lines-----	1, 293, 000
Total-----	3, 931, 430

2. The changes in the situation relative to coast defense, brought about by the development of aircraft, were recognized by Congress as early as the year 1916. In the year 1917 an appropriation of \$3,600,000 was made by Congress for the purchase of aircraft and their accessories for use in connection with the seacoast defense of the United States, and other similar appropriations of approximately \$500,000 each were made in connection with the Hawaiian and Philippine Islands and the Panama Canal Zone. The wisdom and vision of Congress in making these appropriations is established beyond a doubt.

3. The aerial observation of long-range firing of seacoast artillery is the only solution of that very important problem that has demonstrated any actual results. The defense of seacoast areas from aerial attack has only two solutions possible; one a passive defense from the ground, the other an active defense in the air. The limitations and the enormous cost (estimated as \$20,000,000 for the city of Boston) of defense from the ground are well known to all military men and this method of defense is subject to the same criticism as to effectiveness as are all other purely passive methods. An active aerial defense must be the principal reliance. This aerial method of defense must be supplemented from the ground in the same way that naval action for coast defense is supplemented by fixed and mobile artillery ashore, but this secondary defense can be decreased very nearly in proportion to any increase in the aerial protection provided with an even greater proportional decrease in the total cost.

4. The rôle of the Air Service in connection with coast defense is divided into three phases: (a) Observation and adjustment of fire of coast artillery; (b) the defense of the coast and important areas against aerial attack; (c) the offensive-defense of the coast against naval attack.

5. The appropriations requested in connection with the fiscal year 1922 have to do directly with the first of these phases and only incidentally with the second and third phases. This incidental connection is limited to the fact that the acquirement of the sites for aerial coast-defense stations in areas of great national importance will furnish points at which temporary facilities can be erected in case of need to accommodate the additional units which will have to be provided the instant that our national peace is threatened by a power possessing even a moderately large air force.

6. It is desired to emphasize that the first phase of aerial activity is essential to the efficient operation of coast-defense armament emplaced or to be emplaced in the near future. Without aerial observation the longer range of newer seacoast guns is merely a potential power which can never be translated into hits on a hostile target.

7. It is equally true that aerial observation can not exist without aerial protection by pursuit planes, and the lack of definite and permanent provision for this protection is a matter of most serious consequence to the Air Service and to the country at large.

8. Considerations in connection with the state of national finances have made it necessary for the War Department to disapprove a larger program submitted by the Air Service and we are, therefore, requesting an appropriation sufficient only to enable the Air Service to purchase sites for aerial coast-defense stations in the continental United States at five locations which have been determined as the most important from the standpoint of national defense, and for the completion of facilities for the approved garrisons for the insular possessions and the Panama Canal Zone.

9. In connection with these outlying possessions it should be noted that no provision for quarters or facilities has as yet been made for the three air parks which are assigned thereto under the approved distribution of the present strength of the Air Service. These air parks are very essential to the efficient and economical operation of the Air Service garrisons in the foreign possessions due to the distance separating these places from the permanent repair and supply facilities in the continental United States. The function of these air parks is to act as a link in the chain of supply and to perform the major over-

haul and repair of Air Service equipment, and the storage maintenance of the large amount of war reserve equipment which must be maintained at these places in order to make them self-contained in the event communication with the United States were to be interrupted by reason of enemy activity. The additional construction necessary for these units and the construction necessary to provide technical buildings and facilities for the existing garrisons from the greater part of estimates for Hawaii, Philippines, and the Panama Canal.

CONTINENTAL UNITED STATES.

10. An appropriation of \$596,725 is requested for the purchase of seven parcels of land necessary as the sites for five aviation seacoast-defense stations located in the coast defenses of—

Long Island Sound	\$27, 500
Narragansett Bay (3 parcels)	69, 000
Boston Harbor	351, 475
Portland	88, 750
Puget Sound	60, 000
Total	596, 725

The committee is also requested to continue the availability for expenditure, but not for obligation, of certain funds pertaining to the fortifications act approved February 14, 1917, for the reason that certain contracts let prior to June 30, 1920, for the manufacture of aircraft can not be completed prior to June 30, 1921, the date when the funds referred to must be covered into the Treasury, unless such continuance is granted. This delay is in a large measure due to the numerous changes in design which were found necessary during the progress of actual construction of the airplanes in question. The necessity for this continuance was not apparent at the time the estimates were submitted, and therefore the Secretary of War has recently requested that the following amendment be made to the fortifications bill for the fiscal year 1922:

“Provided, That the following unexpended amount of appropriation contained in fortifications appropriation act, approved February 14, 1917, under item ‘Aviation seacoast defense,’ shall remain on the books of the Treasury to the credit of that appropriation until June 30, 1922, to permit completion of contracts made with manufacturers of airplanes prior to June 30, 1920, \$688,277.60.”

11. An appropriation of \$3,600,000 was made in 1917 for the purchase of equipment and construction in connection with the establishment of stations except for the construction of barracks and quarters. An appropriation of \$8,000,000 was made in 1918 for the establishment of eight aerial coast-defense stations. The availability of these funds ceased on June 30, 1920.

12. Prior to that date the War Department had proceeded, as outlined to the committee in the hearings of last year, with the construction of such of these stations as was permissible under the restriction of law relative to the purchase of land contained in the Army appropriation act approved July 9, 1919. This restriction prevented the construction of heavier-than-air stations in five coast defenses, and also prevented construction of balloon base lines in one of these coast defenses, viz, Narragansett Bay.

13. Substantial progress has been made in the construction of the three heavier-than-air stations located in the coast defenses of New York, Chesapeake Bay, and San Francisco, and in the construction of the lighter-than-air base lines at the coast defenses of Portland, Me. Long Island Sound, New York City, San Francisco, and Puget Sound. The bids received for construction of the balloon base line in the Boston Harbor were such that it was impracticable to do more than purchase the structural material for erection at some later date when funds become available. A tabulation of the progress made appears below:

Location.	Amount.	Per cent completion. ¹
Portland (Me.) Harbor: Lighter-than-air—Forts Williams and McKinley.	\$378,166.00	Material being fabricated; sites being cleared.
Boston Harbor: Lighter-than-air structural material only.....	117,668.00	Material being fabricated.
Long Island Sound: Lighter-than-air—Forts Wright and Terry.....	254,750.00	Fort Wright 15 per cent; Fort Terry, material being fabricated.
New York Harbor: Heavier-than-air—Miller Field.....	1,604,591.48	66½ per cent.
Lighter-than-air—Forts Tilden and Hancock..	246,860.00	22 per cent.
Chesapeake Bay: Heavier-than-air—Langley Field.....	664,000.00	90 per cent.
Lighter-than-air—Langley Field.....	345,081.34	100 per cent.
San Francisco Harbor: Heavier-than-air—Crissy Field.....	1,134,000.00	30 per cent.
Lighter-than-air—Forts Scott and Barry.....	193,450.00	40 per cent.
Puget Sound: Lighter-than-air—Forts Casey and Worden...	219,056.00	Fort Worden, 34 per cent; Fort Casey, material being fabricated, site being cleared.
Minor repairs and painting, balloon base lines.....	31,000.00	100 per cent.
Total.....	5,388,722.82	

¹ All contracts let.

All the items listed above are charged to the appropriation of \$8,000,000 made in 1918 except a total of \$530,081.34 under the items pertaining to Chesapeake Bay which pertain to the appropriation of \$3,600,000 made in 1917.

14. The War Department has also purchased airplanes for use in connection with the seacoast defenses to the amount of \$2,600,000 of the following types:

20 bimotored Glenn Martin modified Navy bombers.....	\$1,190,000
10 bimotored G A X (armored attack airplanes).....	530,000
2 ronelti-motored heavy Barling bombers.....	375,000
36 X B L A observation airplanes.....	505,000
Total.....	2,600,000

15. The status of appropriations heretofore made by Congress in connection with the aviation seacoast defense of the continental United States is as follows:

Appropriation.	Amount.	Obligation.	Balance.
Aviation seacoast defense:			
1917.....	\$3,600,000.00	\$3,528,395.27	\$71,604.73
1918.....	8,000,000.00	4,858,591.48	3,141,408.52
Total.....	11,600,000.00	8,386,986.75	3,213,013.25

NOTE.—The unobligated balance of these appropriations is to be covered into the Treasury, pursuant to the fortifications act approved March 3, 1919.

16. The War Department has authorized the submission of an estimate for the purchase of the land only in this year's appropriation. It is considered that the wisdom of at least purchasing the sites for these aviation coast defense stations at this time is obvious. The development of the air forces accompanying an enemy fleet, as well as of swift airplane carriers, has impressed all thoughtful men with the changed conditions under which "coast defense" must be conducted. The acquisition of these sites will permit the War Department to establish temporary and improvised facilities for the work of the Air Service with the Coast Artillery in the observation and adjustment of long-range firing, as well as an initial step in the proper provision for aerial activity in connection with the aerial defense of the important harbors in question, near-by cities, and naval and other facilities. In my opinion, no demands for economy can justify a reduction in the amount of money herein requested for use in connection with the aerial coast defense of the Continental United States.

17. For the general information of the committee, it should be stated that the sites upon which these five heavier-than-air stations and balloon base lines are to be situated have been arrived at after a careful study of not only the existing but also the future needs of the country. Boards of experienced officers were appointed by the Secretary of War on both the Pacific and Atlantic coasts for the purpose of examining each locality approved of by the War Department as of sufficient importance tactically, commercially, and industrially to receive an allotment of one of the five aerial coast defense stations contemplated. It should also be noted that each project was submitted to the aeronautical board (whose membership is drawn from the Army and Navy and which was constituted for the purpose of aiding the cooperation and preventing duplication between these departments in connection with their major projects) and approved by them before its final approval by the Secretary of War.

Insular possessions, Hawaiian Islands.

Current appropriations, fortifications act, 1920-----	\$1, 300, 000
Obligations and reservations -----	1, 287, 350
Balance -----	12, 650

18. Expenditures made and contemplated under the current appropriation will provide, in general, for the following permanent construction:

Luke Field:

(a) Quarters for 12 married officers, 16 bachelor officers, and 6 married noncommissioned officers-----	\$177, 000
(b) Barracks for 2 squadrons-----	80, 000
(c) 4 small warehouses-----	40, 000
(d) Erection of 3 hangars and miscellaneous buildings-----	77, 000
(e) Partial construction of motor-repair shop-----	25, 000
(f) A part of the municipal work incident to establishment of permanent station -----	203, 995
(g) Water-distribution system and emergency supply-----	157, 005
Total -----	760, 000

Fort Ruger and Fort Kamehameha:

(a) Quarters for 3 married officers (4 at Kamehameha) and 4 married noncommissioned officers-----	103, 000
(b) Barracks for 1 balloon company-----	100, 000
(c) Balloon hangar-----	50, 000
(d) A part of municipal work-----	276, 000
Total -----	529, 000

Grand total -----	1, 289, 000
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19. The estimate submitted by the department commander for the accommodation of the approved Air Service garrison in the Hawaiian Islands was for \$1,079,000, and authority was received from the War Department for the inclusion of this amount in the 1922 estimate. A subsequent study of the department commander's estimate has made possible a reduction of \$115,995 in this estimate, and it is accordingly requested that the sum of \$1,079,000 now carried in the subcommittee print in the fortifications bill be corrected to read \$963,005. It is earnestly hoped that this amount will be appropriated in order that this project may be carried forward without interruption and in a way economical of both time and money. The covering in of all funds then available for this work on May 21, 1920, pursuant to the last fortification act, brought about a condition wherein the construction force of the construction quartermaster had to be disbanded on that date. Great difficulty has been experienced in building this force up under the current appropriation, which did not become available until July 1, 1920. During this interval the personnel had been absorbed by civilian firms, which are in keen competition for this class of personnel, and all construction facilities had to be placed in storage. This condition has undoubtedly resulted in a considerable and unnecessary increase of cost to the Government of the work in question.

20. The construction contemplated in connection with the reduced estimate is necessary to complete the permanent housing accommodations for the approved Air Service garrison and to complete the technical buildings and municipal work necessary in connection therewith, as follows:

Luke Field:

(a) Quarters for 24 married officers, 16 bachelor officers, 6 married noncommissioned officers, and 20 bachelor noncommissioned officers	\$298,000
(b) Barracks for 1 air park	50,000
(c) Administration and technical buildings, including \$25,000 for the completion of motor-repair shop partially constructed out of current appropriation	347,000
(d) Completion of municipal work	146,005
Total	<u>641,005</u>

Fort Ruger:

(a) Quarters for 4 bachelor officers and 6 bachelor noncommissioned officers	28,000
(b) Technical buildings, including a silical-generator building and cylinder-storage building	56,500
Total	<u>84,500</u>

Fort Kamehameha:

(a) Silical-generator house and cylinder-storage building	37,500
Grand total	<u>963,005</u>

21. The necessity for the proviso extending the availability of the current appropriation until June 30, 1922, is a direct result of the total cessation of work on May 21, 1920, noted above. The delay in resuming work has necessitated this extension if the work is to be continued under the "purchase and hire" method rather than by "contract," with its consequent savings to the Government of approximately 25 per cent. In the first method, material is procured from stock in the United States as the progress of the work requires, and shipped on transports. In the second method, 25 per cent of all estimated costs would have to be added to cover contractors' profit, transportation charges, and the factor of safety which all local contractors add to their proposals as a protection against further increases in the costs of labor and material. It would, of course, be simpler to let this work out on contract, and in this event the extension of availability of funds would be unnecessary; but we do not desire to pursue this method and are therefore laying the matter before you and requesting your assistance in enabling us to pursue the course which is obviously to the better interests of the Government. These facts were submitted by the department commander in forwarding the estimated cost of this project.

Insular possessions, Philippine Islands.

No current appropriations.

Former appropriation, fortifications act, 1917	\$600,000.00
Expenditures and obligations	599,712.88
Balance	<u>287.32</u>

22. Expenditures from previous appropriation will provide, in general, for the following:

Fort Mills, Corregidor Island:

(b) Barracks for 1 squadron and 2 balloon companies	} ¹ \$141,500.00
(a) Quarters for 7 married officers and 16 bachelor officers	
(c) A part of the essential technical buildings and municipal work	436,171.15
Total	<u>577,671.15</u>

¹ A total of \$141,500 under the appropriation, "Air Service, Army, 1920," was allotted for this construction. Fortification funds were not applicable to the construction of barracks or quarters.

23. The sum of \$1,078,700 has been approved for inclusion in estimates for the last fiscal year 1922 for construction, as follows:

Fort Mills, Corregidor Island:

(a) Quarters for 12 married noncommissioned officers-----	} \$128,700.00
(b) Erection of seaplane hangars, north side, subterranean magazine for explosives, and other necessary technical buildings-----	

Paranaque, Luzon:

(a) Quarters and facilities for 1 air park-----	950,000.00
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Total -----	1,078,700.00
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24. The construction contemplated at Fort Mills is necessary to complete the housing of and the technical facilities for the existing garrison. This construction, together with that contemplated for Paranaque, will provide for all the larger items essential to the approved Air Service garrisons in the Philippine Islands. As has been stated before, an allotment of one air park has been included in the approved distribution of the authorized strength of the Air Service to provide for the supply and major overhaul and repair of Air Service equipment independent of supply and repair depot facilities of the continental United States. This air park will be sent to the Philippine Islands as soon as accommodations can be provided under these estimates.

25. A total of \$950,000 is estimated for establishment of mainland combined land and water aviation station near Paranaque, Luzon, at which the air park will be stationed. The necessity for and functions of this unit were set forth in paragraph 9. The establishment of this station has been found essential to the efficient operation of the air forces in the Philippine Islands. The site chosen is within 7 miles of the city of Manila and connected therewith by an excellent road. It is at present impossible to land an airplane on Corregidor Island, but an estimate of \$250,000 was received too late for inclusion in this estimate for the clearing and grading of a very restricted landing field for use in actual warfare or similar emergency. This fact, combined with the weather and sea conditions at Corregidor Island, forms a most difficult problem in connection with aerial operations and at present necessitates the exclusive use of seaplanes. The Paranaque project will provide the necessary junction point of land and seaplane activities and also the facilities for major overhaul of Air Service equipment in the Philippine Islands.

26. The committee is requested to amend the words "\$600,000 for cleaning, grading, and filling landing field," appearing in the thirteenth and fourteenth lines of page 29 of the subcommittee print, to read "\$600,000 for the purchase, clearing, grading, and filling landing field."

27. The latest project submitted by the department commander which resulted from the proceedings of a board of officers appointed to select a combined land and sea plane site near Manila, provided for the clearing, grading, and filling of site on that part of Fort William McKinley Military Reservation nearest Manila Bay. The board in the selection of this site was influenced by the apparent excessive cost of acquiring a more desirable site theretofore recommended, which existed between the one selected and Manila Bay. A careful study of this project by officers familiar with the local situation and further development subsequent to the submission of the original project indicate the possibility of acquiring the more favorable site of approximately 100 acres bordering on Manila Bay at a cost much less than previously estimated.

28. This site is satisfactory for landing-field purposes as it stands, and, in fact, is so used at the present time by permission of the owners. A revised estimate by the department commander of cost of securing this site indicates a probable cost of \$1,000,000 for the entire site, but the War Department hopes that this cost may be reduced by negotiations which are under way whereby the Philippine government will transfer at least a portion of the site to the Federal Government in exchange for certain other military reservations in the Philippine Islands which are of no further use to the Army, and also through the joint use of an adjoining tract which the Philippine Government contemplates securing for use by the Philippine National Guard Air Service.

29. The negotiations referred to originally contemplated the transfer or Government holdings at Cebu Barracks to the Philippine government in exchange for the transfer by the Philippine government to the United States of the Paranaque tract. These negotiations were temporarily abandoned on receipt of word from the Governor General that his legislative ----- could

not see their way clear to the expenditure of the considerable amount of money involved in the purchase of this Paranaque tract for transfer to the Government. The commanding general has recently been authorized to add Government holdings at five or six other places in the Philippine Islands to the Cebu holdings in an effort to secure favorable action by the Philippine government.

30. The change in the wording of the item of \$600,000 is requested in order that the Air Service may proceed with the acquirement of the necessary land on the most economical basis for the Government. The acquisition of one of these sites is imperative and the cost of clearing, filling, and grading the site already owned by the Government is such a large proportion of the cost of securing the more desirable site that it is planned to use that sum in the purchase of such portion of the latter as can not be secured by transfer without cost from the Philippine government. A small portion of this sum may be used to purchase options on such essential portions of this site as can not be acquired either through transfer or by purchase, thus protecting the Government against subsequent inflation of value of such remaining portions.

Panama Canal Zone:

Current appropriation, fortifications act, 1920-----	\$239, 000. 00
Obligations and reservations-----	239, 000. 00

31. Expenditures made and contemplated under previous appropriations will provide, in general, for the following permanent construction:

France Field:

(a) Quarters for 17 married officers and 24 married noncommissioned officers-----	\$233, 400. 00
(b) Barracks for one squadron-----	62, 000. 00
(c) A portion of the technical buildings but no general administration buildings or storehouses, approximately--	150, 000. 00
(d) Preparation of flying field and certain emergency landing fields along canal-----	481, 250. 00
(e) Municipal work, approximately-----	110, 000. 00
Total-----	1, 036, 650. 00

32. The estimate prepared by the General Staff committee in connection with the defense project of the Panama Canal and recommended for inclusion in the estimates for the fiscal year 1922, totaled \$2,721,600. The final revision of this defense project was not completed until October 10, 1920, so that the amount carried in the Book of Estimates which had to be submitted by September 15, 1920, was necessarily inaccurate. Unfortunately, the amount carried in the estimates, \$1,293,000, will not permit the initiation of work on the preparation of airdrome site at Balboa Fill.

33. The construction contemplated in the estimates for the fiscal year 1922 is as follows:

France Field:

(a) Quarters for 13 married officers, 30 bachelor officers, and 4 married noncommissioned officers-----	\$368, 000. 00
(b) Barracks for 3 squadrons-----	187, 000. 00
(c) Certain administrative and minor shop buildings-----	155, 600. 00
(d) Garage and storehouse facilities-----	96, 000. 00
(e) Duplex land and seaplane hangar-----	180, 000. 00
(f) The necessary municipal and electrical work-----	106, 400. 00
Total-----	1, 093, 000. 00

Balloon base lines, 4 demountable balloon hangars-----	200, 000. 00
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Grand total-----	1, 293, 000. 00
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34. The three barracks included in the estimate are necessary for those units included in the approved distribution of the authorized strength of the Air Service but not as yet sent to the Canal Zone. The additional observation squadron and air park are urgently needed at the present time but it is not feasible to send these troops until permanent accommodations have been provided. This construction will complete the larger items of construction essential to the efficient operation of the approved Air Service garrison of the Panama Canal Zone except for the very serious lack of any provision for starting the work on the airdrome site on the Pacific end of the canal.

35. The Air Service considers that the Panama Canal is the most favorable single objective liable to attack by enemy air forces and the most vulnerable, considering that with the division of our fleet, it is turned from an asset to the national defense into a liability. Immediately that any one of the links in the chain of its operation is destroyed or interrupted. The committee will appreciate how easily possible it would be to interrupt or entirely prohibit the operation of the Panama Canal for many months as a result of a daring raid by an enemy whose fleet is preceded or accompanied by swift airplane carriers, carrying, not only the bombing planes necessary for the demolition work, but also pursuit planes in sufficient concentration of number to beat down any but the very strongest aerial opposition.

36. A very exhaustive study by General Staff officers of the military situation in the Panama Canal Zone has resulted in a defense project which has been approved by the War Department. The Air Service garrison proposed ultimately for the Panama Canal Zone is as follows:

Heavier-than-air.—France Field: One observation squadron, 1 pursuit squadron, 1 day bombing squadron, 1 mixed-group headquarters, 1 air park, and 1 photo section.

Balboa Field: One department Air Service headquarters, 3 pursuit squadrons, 1 pursuit group headquarters, 1 photo section, 1 wing headquarters, 1 mixed-group headquarters, 1 observation squadron, 1 day bombing squadron, 1 air park, and 1 reconnaissance squadron.

Lighter-than-air.—Five balloon companies situated at Forts Randolph, Sherman, Amador, Paitillo Point, and Corozal.

37. It is realized that provision for this ultimate garrison can not be made at this time, nor indeed, until the authorized strength of the Air Service has been increased. It is, however, desired to impress upon the committee the fact that the reinforcement of the Air Service garrison in the Panama Canal Zone is a matter of weeks or months, whereas the establishment of an airdrome at the Pacific end of the canal as contemplated in this project is a matter of years inasmuch as the terrain of the Canal Zone is unfavorable to aviation purposes, and much time must be spent in preparing airdrome sites. It is hoped that there may be found some way in which money might be appropriated for the fiscal year 1922 sufficient to provide for starting work on the preparation of the Balboa Fill airdrome at its estimated cost of \$1,090,000 and that funds will be provided in the 1924 estimates for the construction of the facilities necessary for establishing an air park upon this site.

38. The committee is requested to change the wording of the item as it appears in the estimate in the following particulars: (a) change the words "the aviation station at France Field, Canal Zone," appearing in lines 12 and 13 of the subcommittee print to read "aviation stations." (b) Add the following clause after the last sentence of this item:

"*Provided*, That not to exceed the following sums may be used for the purpose indicated: \$28,000 for one commanding officers' quarters, \$26,000 for each double captains' quarters, \$33,000 for each four-set lieutenants' quarters, \$40,000 for each six-set bachelor officers' quarters, \$22,000 for each four-set non-commissioned officers' quarters, \$187,000 for each barracks, \$72,000 for one administration building, \$37,000 for one quartermaster storehouse, \$30,000 for one technical storehouse, \$29,000 for one garage, \$180,000 for one seaplane hangar, \$66,400 for municipal work, \$40,000 for electrical work, \$50,000 for grading and seeding around buildings, all at France Field, Canal Zone; and \$50,000 for each "demountable balloon hangar."

The above changes are necessary in order that the funds requested may be expended in accordance with the approved project.

NUMBER OF STATIONS.

Mr. SLEMP. How many seacoast aviation stations have you at present?

Gen. MITCHELL. We have three in the United States.

Mr. SLEMP. Where are they?

Gen. MITCHELL. They are New Dorp, Langley, and San Francisco.

Mr. SLEMP. Is New Dorp on Staten Island?

Gen. MITCHELL. Yes, sir. Langley Field is the one at Hampton, Va., and then there is San Francisco.

Mr. SLEMP. Langley Field is something of a composite proposition and is not entirely under the jurisdiction of the seacoast agencies.

Gen. MITCHELL. We have observation squadrons there for the purpose of working with the seacoast defenses; we also have some of our Air Service schools there. We use them all together.

Mr. SLEMP. Langley Field is not regarded as a strictly seacoast defense proposition?

Gen. MITCHELL. We regard it as such—that is, we regard part of it as such because it can be applied from there, and for the present there is no use putting in any other organization for that purpose.

MILLER FIELD, NEW DORP, STATEN ISLAND.

Mr. SLEMP. What is your situation with regard to the Staten Island project?

Gen. MITCHELL. We have the land there and the buildings are about two-thirds completed.

Mr. SLEMP. Have you sufficient money on hand to complete the station?

Gen. MITCHELL. Yes, sir; we have the money on hand to complete the Staten Island project.

Mr. SLEMP. Will you put in the record a complete statement as to the buildings, their character, and the facilities afforded?

Gen. MITCHELL. Yes, sir.

MILLER FIELD, NEW DORP, STATEN ISLAND.

4 hangars (2 seaplane and 2 airplane), permanent.

1 aero repair shop, permanent.

1 dope house and boiler house, permanent.

1 aero storehouse, permanent.

1 motor test house, permanent.

1 armorer's house, permanent.

1 gasoline station, semipermanent.

1 sewage-ejector house, permanent.

1 sewage-disposal plant, permanent.

1 boathouse and pier (steel and wood), permanent.

1 administration building, consisting of administration building, permanent; photographic building, permanent; fire station, permanent; radio transmission building, permanent.

1 infirmary, semipermanent.

1 field officers' quarters, semipermanent.

12 company officers' quarters, semipermanent.

2 noncommissioned officers' quarters, 4-family, semipermanent.

1 noncommissioned officers' quarters, 2-family, semipermanent.

1 bachelor quarters, 18 men, permanent.

1 barracks and mess, 200 men, permanent.

1 post exchange, semipermanent.

1 storehouse and guardhouse, permanent.

4 hose-cart houses, semipermanent.

Remodeled buildings:

1 garage (old barn), semipermanent.

1 clubhouse (old mansion), semipermanent.

Mr. SLEMP. Will you also put in the record a statement showing the airplane and airship equipment it is proposed to have there?

Gen. MITCHELL. Yes, sir. Each observation squadron is equipped with 13 airplanes and has 13 airplanes in reserve. The squadron stationed on Staten Island will have a certain amount of seaplane equipment, in addition, for peace-time work.

Mr. SLEMP. Will you expect to ask in the future for any more money for new construction at Staten Island?

Gen. MITCHELL. We have none in view now.

CRISSY FIELD, PRESIDIO, CALIF.

Mr. SLEMP. What is your situation in regard to the San Francisco project? I wish you would give the same information in regard to the San Francisco station that I have asked for the Staten Island station.

Gen. MITCHELL. Yes, sir. This station will have the same airplane and seaplane equipment as the one on Staten Island.

CRISSY FIELD, PRESIDIO, CALIF.

Permanent buildings: 2 hangars (1 airplane and 1 seaplane); 1 aero repair shop; 1 boiler house and plant; 1 aero storehouse; 1 motor-test house; 1 armorers' building; 1 radio receiving station; 3 hose-reel houses; 1 guardhouse; 1 garage; 1 barracks for 200 men, including post exchange and quartermaster storehouse; 1 building for administration group, including photographic building, radiotransmission, and infirmary; 1 bachelor officers' quarters for 18 men.

Semipermanent buildings: 1 field officers' quarters house; 12 company officers' houses; 2 noncommissioned officers' 4-family apartment houses; 1 noncommissioned officers' 2-family apartment house; 1 boathouse; 1 boathouse pier.

Mr. SLEMP. You do not ask for any money for that station?

Gen. MITCHELL. Not at present.

Mr. SLEMP. How many squadrons do you expect to keep at these two places, respectively?

Gen. MITCHELL. We expect to keep one each for work with the Coast Artillery.

Mr. SLEMP. What kind of a squadron?

Gen. MITCHELL. An observation squadron.

Mr. SLEMP. What about Langley Field?

Gen. MITCHELL. We keep two there for Coast Artillery purposes.

Mr. SLEMP. What kind are they?

Gen. MITCHELL. They are observation squadrons. In addition, however, we have other squadrons at Langley Field.

Mr. ANTHONY. Do you get your equipment for these stations out of the Army appropriation bill or out of this bill?

Gen. MITCHELL. We have gotten it from both places in the past. There were certain airplanes that were contracted for last year that came out of the fortifications bill. We can put a statement about those in the record.

Mr. ANTHONY. I wish you would.

Gen. MITCHELL. I would like to explain that what we are asking for now is a direct adjunct of the coast defenses; it is essentially for the purpose of assisting the Coast Artillery in the execution of their mission.

Mr. SLEMP. You ask for no material?

Gen. MITCHELL. None whatever. We are only asking to get airdromes in the vicinity of the batteries, which do not exist at pres-

ent, so that we can apply the air service in connection with the batteries.

PURCHASE OF LAND AT PORTLAND HARBOR, ME.

Mr. SLEMP. How many acres of land do you purpose purchasing at Portland Harbor, Me.?

Gen. MITCHELL. One hundred and thirty acres.

NECESSITY OF PLACING SEACOAST STATIONS ON THE WATER.

Mr. SLEMP. Is it necessary to have these seacoast stations on the water?

Gen. MITCHELL. You should have them on the water on account of the necessity of working with seaplanes at times, so that they should be on the water.

Mr. ANTHONY. Are you going to use seaplanes?

Gen. MITCHELL. No, sir; not in war. We are using seaplanes because there is a certain number on hand, and they offer certain advantages in time of peace; but we will certainly not use them in time of war against an enemy equipped with a modern air force.

Mr. ANTHONY. You figure that if you go to sea in a seaplane you are going to get back?

Gen. MITCHELL. Yes, sir; although if you go down in a rough sea you are almost as badly off as in any other plane.

Mr. ANTHONY. What is the purpose of putting these aviation stations alongside of our coast defense posts?

Gen. MITCHELL. So as always to give them observation over the water, without which they will be very much handicapped in the conduct of their firing.

Mr. ANTHONY. Is it for the purpose of observation or for the purpose of offense?

Gen. MITCHELL. It is entirely for the purpose of observation, and it has nothing to do with offensive aviation at all, except that under certain conditions we might have to concentrate offensive aviation on the airdromes. It is entirely a matter of fire control.

Mr. SLEMP. It is purely a fire-control proposition?

Gen. MITCHELL. That is what it is for.

Mr. ANTHONY. The statement was made yesterday that the airplane did not furnish entirely satisfactory methods of determining long ranges.

Gen. MITCHELL. That is very true.

Mr. ANTHONY. For the Coast Artillery.

Gen. MITCHELL. That is very true. When you get to 15,000 yards or over it is a very difficult proposition to regulate the fire from an airplane, but that remains to be solved and there are a great many solutions pending on the proposition. But, above all things, you have got to have something to tell them a ship is out there beyond the ordinary vision from the ground. There are two ways you can do it in the air; one way is through the use of balloons, which are really fixed platforms that are higher than the ground; and the second way is by airplanes. Of course, you can also use airships.

Mr. SLEMP. General, you do not contend that we can fire a 12-inch gun successfully without the use of airplanes, do you?

Gen. MITCHELL. No, sir. At the longer ranges it can not be done.

Mr. SLEMP. We have no 14-inch guns in the seacoast defenses of the United States, nor have we any 16-inch guns installed, although one is now being installed.

Gen. MITCHELL. Of course, that is primarily an artillery problem. If they need these airplanes for observation purposes, and if they say their fire is made more efficient with them, in my opinion they should have them. Of course, in the Air Service we have always to be careful not to put too much of the force into a thing that is passive so far as its offensive power is concerned; in other words, we do not want to put too large a proportion into observation. We would like to cut down on observation as much as we can and put the maximum into an air force that will give punch against the enemy. In considering the problem in that way we have put in what we consider the minimum force along these areas. This observation aviation, in addition to working with the Coast Artillery, etc., can keep a patrol over that specific sea area that is near its station.

Mr. SLEMP. That is the purpose of your aviation stations?

Gen. MITCHELL. Yes, sir.

Mr. ANTHONY. In view of the extreme mobility of the airplane, what is the necessity for maintaining fixed posts scattered all along the coast? Why can not you concentrate your airplanes at the place that is threatened and render these observation facilities?

Gen. MITCHELL. That, Mr. Anthony, is dependent upon the number of your ships, the area they can cover, and the front you have to observe.

Mr. ANTHONY. For instance, you have a post at New York and you have one at Norfolk?

Gen. MITCHELL. Yes, sir.

Mr. ANTHONY. Are not your ships there good for a range of several hundred miles?

Gen. MITCHELL. You can not assign patrol districts of more than 200 miles with the equipment of to-day; that is, 200 miles of front. The second thing about that proposition is that in order to keep proper touch between the airplanes and the artillery they must be close enough to each other so that they can exchange ideas with the greatest facility. During the war we made it a principle that you had to have what we called personal liaison between the observers themselves and the batteries with which they were working. In other words, you had to have your observation elements just as close to the troops they were working with as possible, and that obtains as far as we can get it with the Coast Artillery. They ought to be just as close together as they can be, and they ought to work together as intimately as possible. Otherwise, a great many of these problems that remain very largely unsolved will not be worked out, and they will not know how to work with each other. Gen. Coe can tell you about that.

USE OF AIRPLANES FOR OBSERVATION IN FIRE CONTROL.

Mr. SLEMP. Gen. Coe, I would like to ask you this question: What is the necessity for airplanes, not balloons, in the fire control or other uses of the 12-inch long range guns?

Gen. COE. As I said yesterday, for the correction of fire. We have in most of our target practice this year, not only with the long-range guns but with the 12-inch guns themselves, utilized airplanes for observation for the purpose of correcting fire. We have done that consistently whenever we could get in touch with the air service.

Mr. SLEMP. Have you not asked for money and for large amounts of money to provide fire-control facilities for the present ranges of your 12-inch guns, without the use of airplanes?

Gen. COE. Yes, sir.

Mr. SLEMP. Is that satisfactory or not?

Gen. COE. It is the best we can do without the airplane. The airplane is the most effective means of controlling fire we have to-day. It can give us positive and definite information regarding the fall of our salvo that we can not obtain in any other way with the same accuracy and quickness.

Mr. ANTHONY. Although the airplane can not give you the exact data as to range and distance.

Gen. COE. That is correct, Mr. Anthony.

Mr. SLEMP. They simply see where the shot falls and indicate whether it was too short or too far.

Gen. COE. We have used the airplanes particularly in a great many cases with the radio telephone satisfactorily this year in our target practice. They see the shot the instant it falls and note whether it was 500 yards over or directly on the target.

Gen. MITCHELL. Of course, there is this thing to it, Mr. Slemp, you pick up your target first and follow it all the time, and you can do that in no other way, either at night or during the day, except with the airplane.

Mr. SLEMP. Your contention then is that the complete equipment of a seacoast defense with 12-inch guns and the longer range guns require a number of airplanes for observation purposes, and that would require a field where these airplanes may be stored when not in use and to which they can come back for repairs and as a home station, is that it?

Gen. MITCHELL. Exactly as a home. We have only asked in this bill just for the fields. No improvements are asked for at all. If you do not provide the fields in these vicinities, we simply will not have them. We can put the organizations there for work with the coast batteries each year without additional improvements.

Mr. SLEMP. Pursuing Mr. Anthony's question a little further, what is the necessity for having these stations so close to your batteries?

Gen. MITCHELL. For the reasons I explained before, so they can work intimately with the batteries.

Mr. SLEMP. How do you establish any intimacy when the airplane is away over the water and simply comes back at night to its home?

Gen. MITCHELL. It is just like any other observation means. The people observing out of the airplanes have got to work intimately with the people handling the Artillery. They have to know their methods, and the people on the ground have to know the methods of the observer in the air. As a matter of fact, in fire conducted from the airplanes to-day, they pick up the target, tell which is the most

dangerous target, tell where the shots are falling and the character of fire that should be used. That is what actually happens, and in order to do that there must be the most intimate contact between the air and the ground. When you try to reduce it to a question of the percentage of additional efficiency that this would give to the coast batteries, I think Gen. Coe would tell you that it was considerable, and that without airplanes the efficiency of any coast weapons used in that way is very greatly diminished.

Gen. COE. The estimates submitted you will notice are only for certain centers of defense.

Gen. MITCHELL. That is all.

Mr. SLEMP. But in every one of those centers mentioned you already have, under the Army bill, aviation fields?

Gen. MITCHELL. Oh, no. There are no fields in Maine at all. There are none around Boston owned by the Government nor are there any around New London or Narragansett. In addition, Narragansett is a naval base and quite an important place.

Mr. ANTHONY. Are there no landing fields for airplanes around Portland?

Gen. MITCHELL. Not at the present time.

Mr. ANTHONY. Or at Boston?

Gen. MITCHELL. No, sir. There is a place being used now that we are renting temporarily, and it is about 20 miles from Boston, at Framingham. We have been refused permission to rent that for next year. We have no facilities near those big cities.

Mr. SLEMP. Have we a naval base at Boston, Narragansett Bay, and Long Island Sound?

Gen. MITCHELL. There will be a naval base at Narragansett.

Mr. SLEMP. I mean a naval aviation base.

Gen. MITCHELL. They have what they call facilities. They have them scattered all up and down the coast there, but they are not suitable for this work, so far as that is concerned.

Mr. SLEMP. They constitute landing places, do they not?

Gen. MITCHELL. No, sir; they are for seaplanes.

Mr. SLEMP. Do they not have some land connected with them?

Gen. MITCHELL. No, sir; they are entirely for seaplanes.

Mr. ANTHONY. Can the seaplane be used for the purpose of directing coast artillery fire?

Gen. MITCHELL. Yes, sir; it can be done.

Mr. ANTHONY. Why can not a naval plane make these observations?

Gen. MITCHELL. The Navy have no planes that are equipped to work with the Coast Artillery in the way that we have, Mr. Anthony. The Navy equipment during the war along the coast was for the purpose of detecting the presence of submarine and hostile shipping, and that was carried out by flying boats because the hostile force had no airplanes with which to contest the control of the air. Their equipment for accompanying the fleet for observation purposes and their airplanes that will be flown off their turrets will be equipped in a somewhat similar manner to this equipment for the Coast Artillery; but our ships for work with the Coast Artillery eventually will be airplanes that can stay in the air a very long time and go very far

out to sea, and will have the ability of carrying very powerful telephone and telegraph apparatus, which they can not carry on the ships that they will use for observation purposes or to be flown from turrets. The airplane carriers in the Navy will be used for the purpose of carrying offensive aviation to fight the enemy. These airdromes asked for can be used for local defense and for offensive aviation in addition. It is a coast defense proposition essentially, and, as I say, we only ask for the purchase of the sites.

Mr. SLEMP. Why would not Mitchel Field take care of your Long Island Sound proposition?

Gen. MITCHELL. It has no water facilities and it is the place where we want to concentrate the major part of the offensive aviation for the defense of the area around New York.

Mr. SLEMP. Staten Island would do that.

Gen. MITCHELL. Not to the same extent that Mitchel Field would. Mr. SLEMP. Mitchel Field is surrounded by airdromes, and you can deploy easily 1,600 or 2,000 airplanes in the vicinity of Mitchel Field without any trouble at all.

Mr. SLEMP. Why could you not use Staten Island and Mitchel Field and eliminate the Long Island Sound proposition?

Gen. MITCHELL. In the first place, you have not any water facilities at Mitchel Field, and in the second place, it mixes up the aviation that is directly attached to your Coast Artillery organization.

Mr. SLEMP. Then why did you purchase the Staten Island project as a coast-defense project if it does not have water when you need water?

Gen. MITCHELL. There is water there.

Mr. SLEMP. Why can you not use that field and eliminate your Long Island Sound proposition?

Gen. MITCHELL. You mean the one at New London?

PURCHASE OF LAND, LONG ISLAND SOUND.

Mr. SLEMP. You have an item here for Long Island Sound amounting to \$27,500.

Gen. MITCHELL. That is New London. That can not be eliminated, because you have a group of batteries around there that it would be impossible to work with from Staten Island. You could not work with them that far away.

Mr. ANTHONY. Why do you need water at these stations if you do not intend to use the flying boats?

Gen. MITCHELL. We are using up the flying boats we have. In time of peace, where you are working way over the water, it is a little better for the personnel to have the flying boats, and we have them on hand now. We had a considerable number of forced landings this year in the water and we did not lose a single crew, and we only lost one ship permanently by it, as I remember. It is often better in order to protect your personnel to let them fool around with a flying boat. It develops the instruments and methods in very much the same way and also saves the material.

Mr. SLEMP. I thought I had somewhere a list of the 113 aviation fields in the United States.

Gen. MITCHELL. No; we have projects for airways, Mr. Slempe, where planes have landed, but the United States only owns 15 outside of these coast outfits. We have gone all over the country so as to fly out these flying routes in case we had to use them and encouraged the municipalities in different places in providing air facilities.

Mr. SLEMP. There are 30 flying fields owned by the United States in active use——

Gen. MITCHELL. We have fifteen airdromes.

Col. GILMORE. We have 15.

Mr. SLEMP (continuing). Twenty-eight leased, 6 authorized but not complete, and 10 to be disposed of.

Gen. MITCHELL. I think you have included in that every aviation activity. We can put in a statement about that.

Col. GILMORE. That includes all the border-patrol stations.

Col. FULLER. It includes also the aeronautical experiment plant and all the supply depots and repair depots.

Mr. SLEMP. Is it true that at all of these aviation stations there is no land?

Gen. MITCHELL. There is no landing field I know of as an essential part of a naval aviation station.

Mr. SLEMP. There is simply the water plus the shore, and practically nothing else?

Gen. MITCHELL. Yes, sir.

Col. FULLER. At Rockaway, which is not owned by the Navy, they have a little land there, and they carry on some nonrigid airship work, but they are not asking money for any improvements there; they do not own the land.

Mr. ANTHONY. Is the Navy flying any airplanes proper or are they all flying boats?

Gen. MITCHELL. The Navy is flying a great many airplanes; in fact, they are going more into airplanes now than anything else.

Mr. SLEMP. Where is the home of these various airplanes at night.

Gen. MITCHELL. They have some land airplanes here at Bolling Field and the marines have some at Quantico and at Paris Island, and they have airplanes on the Pacific coast. They have them at Pensacola, and everywhere where they have their activities they have land planes, except at these water stations.

Mr. SLEMP. Why do you not ask for naval stations south of Long Island Sound?

Gen. MITCHELL. Because we have one at New Dorp, one at Langley Field. Charleston is the ninth on the list of priority and we will not ask for that until later.

Mr. SLEMP. Has the Chief of Coast Artillery, through his organization, investigated the land areas around the several coast defense posts to see if any of it is available for use as airplane fields.

Gen. COE. Very thoroughly, Mr. Slempe, in connection with the air service. A board was convened a year ago last summer which visited and made a careful study on the ground of all the possible locations from Maine to the Chesapeake Bay area. We did not make any attempt to go into the establishment of stations for the smaller coast

defenses on the South Atlantic and Gulf coasts. There are no long-range guns south of Cape Charles, except at Galveston and Pensacola, and for fire control at Pensacola we depend upon the naval station.

Mr. SLEMP. Then you can use the naval station at times?

Gen. COE. We do it when the air service is not in the vicinity and can not furnish us observation. We do it for target practice purposes. Probably, in case of war, involving that coast line, we would be able to get in touch with our own service.

Gen. MITCHELL. It is really contrary to law to use any Air Service now for such operations except those attached to the fleet, and if it is not concentrated under one Air Service there will be all sorts of mixups in methods and means and everything else in the future.

Mr. SLEMP. Who constituted that board?

Col. FULLER. Gen. McNeill, Coast Artillery Corps, Maj. Reynolds, Air Service, and a representative of the constructing quartermaster's office. This matter was studied by several boards and perhaps you will remember, Mr. Slemp, that the law directed that no sites could be purchased out of the money which was appropriated for the purpose until it was established that no land then owned by the Government could be used for the purpose, and the matter was investigated prior to the war and studied during the war, and finally passed on by this board. Their recommendation came to the Chief of the Air Service and the Quartermaster General and the Chief of the Coast Artillery, and were considered by the aeronautical board, which is a joint Army and Navy aeronautical board, for the study of the question as to whether there was duplication in giving the Army these stations; and it was passed on also as a general proposition by the joint board for the Army and Navy. It was probably one of the most thoroughly studied propositions that you have had to deal with in some time.

Mr. FRENCH. Mr. Chairman, if the committee desires we could insert about three or four pages from the hearings before the naval subcommittee that would show the status of all naval air stations and show whether the land is owned by the Navy Department or whether it is leased or whether it is owned jointly or not.

Mr. SLEMP. I think that should be put in the record.

Mr. FRENCH. The pages referred to are pages 624 to 628, inclusive. (The statements referred to follow:)

Naval aviation personnel, Nov. 30, 1920.

Station or detachment.	Officers.					Enlisted.		Ratings.
	Total.	Avia- tors.	Stu- dent avia- ters.	Ground officers.		Pilots.		
				Line.	Staff.	H/A.	L/A.	
Atlantic Fleet air force	75	52	3	16	4	1	0	154
Pacific Fleet air force.....	60	44	2	9	5	10	0	508
Abicad.....	16	13	0	1	2		4	35
Anacostia.....	18	12	1	2	3	1		210
Cape May.....	4	0	0	2	2			20
Chatham.....	1	0	0	1	0			15
Coco Solo.....	27	13	1	9	4		1	141
Dahlgren.....	1	1	0	0	0			03
Great Lakes.....	10	2	0	8	0			1,130
Hampton Roads.....	67	51	1	8	7	3	3	720
Lakehurst.....	2	0	0	0	2			
Pearl Harbor.....	14	11	0	0	3			77
Pensacola.....	121	55	32	17	17	12	7	700
Rockaway.....	30	16	0	6	8			417
San Diego.....	73	51	1	7	14		3	707
Navy Department.....	44	16	0	18	10			
Hospitals.....	7	6	0	1	0			
Aircraft factory.....	20	6	0	4	10			
Army fields (training land planes).....	25	13	12	0	0			
McCook Field (experimental).....	1	1	0	0	0			
Recruiting.....	1	1	0	0	0			
Naval Academy (postgraduate).....	2	0	0	2	0			
Inspection.....	12	2	0	6	4			
Total.....	631	366	53	117	95	27	33	5,743

¹ Includes total 1,430 with 1,193 under instruction for aviation; navigation has additional men for machinist rating general at this school under training. The original figure (submitted to the committee) of 2,931 men at Great Lakes for training school and overhead was furnished by the Bureau of Navigation. This figure has been corrected. Aviation has but 1,193 men under instruction and 257 instructors and aviation ratings.

² Includes 23 officers under training. New class, 37 additional officers, started Dec. 1, 1920

Legal status of naval air stations—Authority for establishment of aviation stations.

Name of station or activity.	When established.	By what authority.	Is the land Government owned?	Was the land acquired primarily for the purpose of establishing this aviation activity?	Was it in possession of the Navy before this aviation activity was started there?
United States Naval Air Station: United States naval operating base, Hampton Roads, Va	Sept 8, 1917...	Secretary of the Navy, under urgent deficiency act approved June 15, 1917	Yes	Land was acquired under urgent deficiency act, approved June 15, 1917, for the purpose of establishing this aviation activity.	No
Pensacola, Fla.	Nov. 16, 1914. air activities had been carried on since 1914 but as station was formally established Dec 7, 1917	Secretary of the Navy under urgent deficiency act approved Aug 20, 1916	Yes	Land was acquired under urgent deficiency act, approved Aug 20, 1916, for the purpose of establishing this aviation activity.	Yes

Legal status of naval air stations—Authority for establishment of aviation stations—Continued.

Name of station or activity.	When established.	By what authority.	Is the land Government owned?	Was the land acquired primarily for the purpose of establishing this aviation activity?	Was it in possession of the Navy before this aviation activity was started there?
Rockaway, N. Y.	Apr. 16, 1917....	.....do.....	No; held under permit from commissioner of parks of city of New York; no rental is charged; steps are under way to acquire title; city of New York will transfer to Navy subject to congressional authority to accept.	Yes.....	No.
Experimental station, Anacostia, D. C.	Oct. 19, 1917....	Secretary of the Navy, under naval appropriation act approved June 15, 1917.	Yes; by War Department, which department has authorized use by Navy.	No.....	No: Army.
Coco Solo, Canal Zone.	July, 1917.....	Secretary of the Navy, under Executive order of the President No. 3257 of Apr. 9, 1920; prior to that, under naval appropriation act approved June 15, 1917.	Yes.....	No; was previously owned by the Government; was transferred to Navy Department for specific purpose of a naval reservation; a submarine base and air station was established thereon.	No: was under the Army.
San Diego, Calif.	July 27, 1917..	Presidential proclamation under special act approved July 27, 1917 (40 Stat. L., 247).	No.....	Yes.....	No.
Chatham, Mass.	June 15, 1917..	Secretary of the Navy, under urgent deficiency act approved June 15, 1917 (40 Stat. L., 203).	It is under purchase; same not completed yet.	Yes.....	No.
Cape May, N. J.	Oct. 6, 1917....	Special act of Congress Oct. 6, 1917, "to provide for the acquisition of an air station site for the United States Navy" (40 Stat. L., 344), as modified by naval appropriation act of July 1, 1918 (40 Stat. L., 720-721), authorizing President to take immediate possession.	Under purchase.	Yes.....	No.

Legal status of naval air stations—Authority for establishment of aviation stations—Continued.

Name of station or activity.	When established.	By what authority.	Is the land Government owned?	Was the land acquired primarily for the purpose of establishing this aviation activity?	Was it in possession of the Navy before this aviation activity was started there?
Pearl Harbor, Hawaii.	Nov. 26, 1919..	Secretary of the Navy, under authority of the naval appropriation act approved July 1, 1918.	Yes.....	Ford Island was purchased under authority of naval act of July 1, 1918, for joint use by the Army and Navy for aviation purposes.	No.
Lakehurst, N. J.	May 16, 1919..	Secretary of the Navy, under naval appropriation act approved July 1, 1918 (40 Stat. L., 706), "Aviation to be expended under the direction of the Secretary of the Navy * * * including acquisition of land by purchase * * *."	Under purchase now.	Yes.....	No.
Naval aircraft factory, navy yard, Philadelphia, Pa.	July 10, 1917..	Secretary of the Navy, under naval appropriation act approved June 15, 1917.	Yes.....	No.....	Yes.
United States naval training station, Great Lakes, Ill., facilities for training reserve officers.	June, 1917.....	Secretary of the Navy, under urgent deficiency act approved June 15, 1917.	Yes.....	No; it was part of the training station.	Yes.
Helium production plant, Fort Worth, Tex.	November, 1917.	Act of June 15, 1917....	Yes.....	Yes.....	No.
Wind tunnel and engine testing laboratory at United States navy yard, Washington, D. C.	Established as an adjunct to model basin in 1915 from Construction and Repair funds; not paid for from aviation funds.	Secretary of the Navy.	Yes.....	No.....	Yes; part of navy yard.
Marine flying field, marine barracks: Parris Island, S. C.	May 21, 1919..	Secretary of the Navy, under naval appropriation bill for fiscal year 1919.	Yes; purchased under naval appropriation act July 1, 1918, appropriating \$150,000 under "Marine recruiting station, Port Royal, S. C."	No.....	Yes.
Quantico, Va..	June 12, 1919..	.....do.....	No; leased..	Leased for aviation purposes.	No.
San Diego, Calif. (Dutch Flats).	Not yet established.	Secretary of the Navy, under naval appropriation bill for fiscal year 1921.	Yes.....	No.	Yes.

Legal status of naval air stations—Authority for establishment of aviation stations—Continued.

Name of station or activity.	When established.	By what authority.	Is the land Government owned?	Was the land acquired primarily for the purpose of establishing this aviation activity?	Was it in possession of the Navy before this aviation activity was started there?
First Air Squadron, Santo Domingo, Dominican Republic; Fourth Air Squadron, Port au Prince, Republic of Haiti.	Santo Domingo, Feb. 10, 1919; Haiti, Feb. 18, 1919.	Secretary of the Navy under naval appropriation bill for fiscal year 1920.	No; leased..	Yes.....	No.
Flight L, United States Marine Corps, Guam.	Not yet established; personnel and material en route.	Secretary of the Navy under naval appropriation bill for fiscal year 1921.	Location not yet decided upon; board now sitting to determine location.	Not yet located; probably Government land.	If Government land, yes.
Pacific coast rigid station; not yet fixed. •	Not yet established; legislation has been requested authorizing the procurement of a site at Camp Kearny, Calif.	Not yet authorized; hangar is, however, authorized in naval appropriation act approved June 4, 1920.	Not yet procured.	It will have been, when it is finally procured.	No.

LEGAL STATUS OF NAVAL AVIATION PERSONNEL.

JANUARY 24, 1921.

1. The act of August 29, 1916, limits the maximum number of Regular Navy personnel allowed to be ordered to duty involving actual flying at any one time, as follows:

Officers, 150; enlisted men, 350.

2. The act of July 1, 1918, temporarily increased the number of enlisted men allowed to be ordered to duty involving actual flying from 350 to 10,000. This provision has never been canceled and is still in force.

3. The act of August 29, 1916, established the Naval Reserve, one of its classes being the Naval Reserve Flying Corps. During the war naval aviation personnel was reinforced under the general provision of this, which reads:

"Members of the Naval Reserve Force may be ordered into active service in the Navy by the President in time of war or when, in his opinion, a national emergency exists."

4. There is no legislation limiting the number of reserve personnel on active duty that may be ordered to duty involving actual flying.

The act of June 4, 1920, limits the number of reserve officers that may be employed on active duty as follows:

"That the number of commissioned officers of the line, permanent, temporary, and reserve, on active duty shall not exceed 4 per cent of the total authorized enlisted strength of the Regular Navy * * *."

"Provided further, That 500 reserve officers are also authorized to be employed in the aviation and auxiliary service."

Temporary officers employed on active duty under the provisions of the first of the above clauses will be automatically returned to their former status six months after the declaration of peace with Germany, or at such time prior thereto as the President may declare that the state of national emergency has ceased to exist.

5. Plans for future operations to 1925 call for a constant force of about 500 naval aviators, all of whom should be commissioned officers.

6. On November 30, 1920, the aviation officer personnel consisted of the following:

	Naval aviator.	Naval student aviator.	Ground officers.	Staff officers.	Total.
Regular.....	54	20	24	81	179
Temporary.....	63	20	56	.....	139
Reserve.....	249	13	37	14	313
Total.....	366	53	117	95	631

A number of these temporary and reserve officers will qualify for the regular service upon examination in May, 1921.

7. Should reserve officers be removed from active duty, naval aviation would be crippled to a state of inactivity until such time as regular naval officers could be graduated from the six months' aviator course at Pensacola, present allowed rate about 100 per year, to fill all vacancies created that will not be filled by the reserve officers not now on active duty who may qualify for the regular service upon their examination in May, 1921.

8. The removal of all reserve officers from active duty at this time would reduce aviation officer personnel as follows:

Naval aviators, 249/366, 68 per cent.

Student naval aviators, 13/53, 24.5 per cent.

Line officers, 37/117, 31.6 per cent.

Staff officers, 14/95, 14.7 per cent.

Mr. SLEMP. Did this board find any Government property that could be used? Did they report adversely on every single one?

Col. FULLER. No, sir; Langley Field is used and also Crissy Field, at the Presidio of California, is used.

Mr. SLEMP. They are already established as seacoast defense propositions.

Col. FULLER. Yes, sir; and these are the ones remaining from last year's project. There was no land available for the purpose for which we are asking an appropriation. I am speaking now of the heavier-than-air stations. Of course, in the case of the balloon stations, all of those that were contemplated are located on Government land except one, in the coast defenses of Narragansett Bay.

BALANCES OF WAR APPROPRIATIONS.

Mr. SLEMP. You have had hanging over from the war appropriations, as we might call them, \$8,000,000 for expenditure on seacoast defense stations. How did you allot and expend that money?

Col. FULLER. The status of appropriations heretofore made by Congress in connection with aviation, seacoast defense, of the continental United States is as follows: Of the appropriation, aviation, seacoast defense, in the act of 1917, amounting to \$3,600,000, there are obligations of \$3,528,395.27, leaving a balance of \$71,604.73.

Mr. SLEMP. Will that lapse on June 30?

Col. FULLER. Yes, sir. Aviation, seacoast defense, act of 1918, \$8,000,000.

Mr. ANTHONY. What was the amount of the 1917 appropriation?

Col. FULLER. \$3,600,000. Of the \$8,000,000 of appropriation, there was obligated \$4,858,591.48, leaving a balance of \$3,141,408.52. Total

of both appropriations, \$11,600,000; total obligations, \$8,386,986.75; balance, \$3,213,013.25.

Mr. SLEMP. Will that lapse on June 30?

Col. FULLER. Yes, sir.

Mr. SLEMP. Now, explain how you have expended that \$8,000,000.

Mr. FRENCH. Did you mean that that \$3,213,000 would lapse, or may part of that be obligated before the end of the fiscal year?

Col. FULLER. No, sir; it could not be obligated after June 30 last, and will lapse and not be available for expenditure after June 30 next. That brings up another question which we would like to submit where these funds have been obligated, but they can not be expended until after June 30.

Mr. FRENCH. As I understand it, that \$3,213,013.25 has not been obligated at all, and therefore it is too late now either to obligate or to expend it in any way.

Col. FULLER. Yes; that is correct.

Mr. ANTHONY. Have you let contracts for all the other \$8,000,000 that you say is obligated?

Col. FULLER. Yes, sir.

Mr. SLEMP. And that must be expended before June 30?

Gen. MITCHELL. Yes; that must be paid out before June 30, the way we interpret it.

Mr. ANTHONY. I would like to hear now what we have got for that money.

Col. FULLER. For the \$8,000,000, in May, 1919, for purchase of approximately 213 acres of land at New York, Staten Island (that was at New Dorp), \$420,041.48. For construction at Staten Island, the allotment to the Quartermaster General was \$1,289,550. The allotment for the Presidio, San Francisco, Crissy Field, \$1,134,000.

Mr. FRENCH. What was that for?

Col. FULLER. For Crissy Field, at the Presidio, San Francisco.

Mr. FRENCH. Was it for land or for the entire project?

Col. FULLER. Not for land, but for the construction of the facilities. It is on the Presidio Reservation.

Mr. FRENCH. And no land was purchased.

Col. FULLER. No land was purchased.

Mr. ANTHONY. Was that for the construction of barracks and quarters?

Col. FULLER. Yes, sir; and hangars, shops, ramps, and runways.

Mr. ANTHONY. What was the nearest field you had to San Francisco before that field was developed.

Col. FULLER. Mather Field, used during the war at Sacramento.

Mr. ANTHONY. How far away?

Col. FULLER. Ninety miles in an air line.

Mr. SLEMP. I may state here, Mr. Anthony, since you were not on the subcommittee last year, that during the war they asked for 16 of these stations and the committee gave them 8 stations, expecting them to cost about \$1,000,000 each. Last year there was quite a discussion about this, and the war being over the committee did not go on with the 8 stations, but the committee did decide, inasmuch as the lands had already been purchased at Staten Island, although at an extravagant price, and also a part of the money expended at San Francisco, to go on with the work at those 2 stations, 1 on the Atlantic coast and 1 on the Pacific coast, and also to do some work down at Langley Field.

The action of the committee was contested in the House, and the House sustained the committee as to its attitude. Now, that left a lot of money, or \$8,000,000, which was intended originally for eight stations, costing \$1,000,000 each. It left that amount to be expended on these three stations. It was reported and the committee found that they could not build a satisfactory station and provide the equipment, etc., with that \$1,000,000. Their reliance was based upon the discretion, good sense, and judgment of the Air Service and of the Coast Artillery Service in using the \$8,000,000 solely on those three stations. Then there came up the question of whether you could use any of that money for Langley Field or not. It was a question of whether that being an Army base training school it was really the proper place at which to spend any of this money. That accounts for the fact that they can return \$3,213,013.25. It also shows that the original estimate for the construction of a station at a cost of \$1,000,000 was much less than what they have expended, inasmuch as they have taken the full \$8,000,000 for these three stations, so that the establishment of an aviation field, irrespective of the planes, if these two or three fields are any precedent, will cost quite a number of millions of dollars. Quite a number of millions of dollars must go into the fields themselves before you get to the equipment.

Col. FULLER. There are some other expenditures.

Mr. SLEMP. I think that is a fair statement of it.

Gen. MITCHELL. I think that is a fair statement.

Mr. SLEMP. You were going into an explanation of your expenditure of the \$8,000,000.

LANGLEY FIELD.

Col. FULLER. For the erection of hangars, with ramps, at Langley Field, \$60,000, and for miscellaneous construction at Langley Field, \$419,000.

Mr. SLEMP. You finally decided, then, to take the risk of using some of this money for Langley Field, in spite of the silence of the committee on the subject?

Col. FULLER. We felt this way about that all along, that the money was available for the purpose; but the thing that embarrassed us was that without a limit of cost being fixed we could not undertake such construction as we thought would be wise and in the interest of the Government to put up at a station at which the Government had put up permanent buildings.

Mr. ANTHONY. What did you build at Langley Field with the \$419,000?

Col. FULLER. One firm-alarm system——

Mr. ANTHONY (interposing). Do you mean for protection against fire?

Col. FULLER. Yes, sir.

Mr. FRENCH. Will this item be expended? The construction work you first cited amounted to \$60,000, and then the miscellaneous item, I understood, was \$419,000.

Col. FULLER. The first there was for hangars.

Mr. ANTHONY. What did the fire house cost?

Col. FULLER. A fire house was not built out of this money; the fire-alarm system, \$12,000; a group heating plant, \$125,000——

Mr. ANTHONY (interposing). Do you mean a central heating plant for the whole post?

Col. FULLER. Not for the whole post. A part of the heating-plant system was in, but there was no money for carrying it on, and it was stopped. This was to connect up that heating plant so as to get the heating in the most efficient and economical way.

Mr. ANTHONY. You are maintaining a heating plant that was built there during the war?

Col. FULLER. Modified to make it a cheaper and more economical system.

Mr. SLEMP. As a matter of fact, with reference to the Langley Field appropriation, if you do not get it from the Army bill you will get it from the fortifications bill. That is about the size of it, because those facilities for training schools are for every other arm next year.

Col. FULLER. Yes, sir; but we feel this way, that when the whole situation is surveyed there has been a less proportionate amount for Langley Field taken from the fortifications bill appropriation than would be the logical proportion, considering what facilities are carried on at Langley Field on account of the coast defense situation.

Mr. SLEMP. Still, it would be wiser, it seems to me, to put Langley Field either under the jurisdiction of the Army or the seacoast defense, one or the other, so that one committee could handle the whole proposition.

Col. FULLER. As we understand it, it should go under one bill, and we intended to consult the committee as to where it should be handled.

Mr. SLEMP. We will be perfectly willing to take it under the fortifications committee, along with Staten Island and the Presidio project, taking in three coast defense stations, all located along the coast.

Col. FULLER. That would be perfectly logical.

Mr. SLEMP. It should be at one place.

Col. FULLER. The other items are, completing boathouse, \$30,000; sidewalks, \$42,000; exterior lighting, \$60,000; water tank connections to distributing system, \$5,000; sanitary sewer, \$29,000; road from main post to shop hangar, \$66,000; storm sewers, \$50,000; amounting to \$419,000.

Mr. SLEMP. Does that equip Langley Field with all necessary facilities?

Gen. MITCHELL. That will be built up progressively from year to year, as the development takes place in the application of your whole air forces.

Mr. SLEMP. If it is simply to be an observation point from which to observe the guns——

Gen. MITCHELL (interposing). That is only a part of it. This development that you have now will be enough for the coast defense for a long time to come, at least. The whole development of the proposition on the York Peninsula, however, will be a very great one from our standpoint.

Mr. SLEMP. How many acres of land have you there, or do you recall?

Gen. MITCHELL. One thousand six hundred and fifty acres available for use plus 3,388.1 acres of swamp lands and oyster beds for bombing field or necessarily acquired to prevent claims for damages due to dredging operations. We have a large place there.

Mr. SLEMP. You have a wonderful training proposition there, with seacoast guns, railroad mounts, and every other form of artillery. You use balloons at Camp Eustis?

Gen. MITCHELL. Yes, sir; we have an air station down there, too.

Mr. SLEMP. How about the other expenditures?

STATEN ISLAND.

Col. FULLER. Construction at New Dorp, \$95,000. The old construction division revised their plans several times to reduce the cost of construction up there, and at all of these stations, including New Dorp and San Francisco, they followed a different type of construction than the construction they have used for the Army prior to the war. It is very much simpler and cheaper.

They found that they had certain buildings, or farm buildings, which would have to be removed at some considerable expense, and that some of them could be made over so that they would be of use. That item of \$95,000 is made up this way: Preparation of flying field, removal of trees, etc., \$9,000; razing old buildings and old fence not required in the project, the salvaged material to be used in repairs to other buildings, \$600; convert stable and hay storage into garage, and pave yard for parking cars, \$11,400; convert old farm house into officers' mess, replacing plumbing, heating, and lighting system, \$27,700; convert dairy into radio receiving station, \$5,950; general grading, sodding, planting trees around buildings, quarters, etc., filling in of edges of pond to inclosing wall, and raising wall, \$28,400; convert ice house and bull pen into utility officers' shop and storage yard, \$2,000; and \$9,950 for contingencies.

Mr. SLEMP. Was any money spent there for land?

Col. FULLER. \$420,000 year before last. That is the item Mr. Slemp mentioned.

Mr. SLEMP. That does not take up the whole amount, does it?

Col. FULLER. That completes the details of the \$95,000. This [indicating] shows the type of the commanding officer's house.

Mr. SLEMP. Does that come within the limit of cost?

Col. FULLER. \$12,000; yes, sir, as we understand it. That is wire lath and stucco. It is less of a building than noncommissioned officers' quarters are. In the old days that was standard noncommissioned officers' quarters. For the purpose of painting and making necessary minor repairs on buildings in the following coast defense stations amounting to \$31,000—

Mr. SLEMP (interposing). What has that to do with aviation stations?

BALLOON BASE LINES.

Col. FULLER. These buildings are used in connection with the balloon base line.

Mr. SLEMP. It is a fire-control proposition?

Col. FULLER. The balloon base lines are.

Mr. SLEMP. Why did not that come in under fire-control? It is a fire-control proposition, including funds for necessary structures.

Col. FULLER. It is for balloon fire control in the coast defenses. The particular coast defense balloon base lines concerned in this item are as follows: New York Harbor, San Francisco Harbor, and Puget Sound. In the next item we have the establishment of balloon base lines in the following coast defenses: Portland (Me.) Harbor, Boston Harbor, Long Island Sound, New York Harbor, Puget Sound, San Francisco Harbor.

The total there is \$1,410,000 and the total obligation is \$4,858,591.48, leaving a free balance——

Mr. SLEMP (interposing). That \$1,400,000 is altogether for balloons?

Col. FULLER. Yes, sir.

Mr. SLEMP. And it is altogether in relation to serving batteries?

Col. FULLER. Yes, sir; in the coast defense. No land was purchased for balloons.

Mr. SLEMP. You are in a position to have the use of balloons for all of your 12-inch and other long-range guns?

Col. FULLER. Except at Narragansett, which is included in the \$596,000 estimate.

Mr. SLEMP. Does that include the balloons themselves?

Col. FULLER. No, sir.

Mr. SLEMP. What does it include?

Col. FULLER. It includes the hangars, the gas plant, cylinder storage, and runway for hangars.

Mr. SLEMP. Where do you get the balloons?

Col. FULLER. Heretofore all the balloons used, or that have been used up to the present time, have come from the war supplies.

Mr. SLEMP. Will they furnish you more if you desire them?

Col. FULLER. Yes, sir.

Mr. SLEMP. Have you assurances of that kind?

Col. FULLER. Yes, sir.

Mr. ANTHONY. What was this money used for, or for the construction of what buildings?

Col. FULLER. For hangars, gas-generating shelters, cylinder storage, and approach to the hangars.

STATEN ISLAND.

Mr. ANTHONY. What buildings are you constructing at Staten Island? You do not seem to have spent much money there. How many buildings have you there?

Col. FULLER. I will insert the list.

(The list referred to has been inserted previously on page 322.)

Mr. FRENCH. I thought you gave the amount at Staten Island as \$1,200,000.

Col. FULLER. Yes, sir; for the new construction.

Gen. MITCHELL. That is all we asked in last year's appropriation.

Col. FULLER. That is 66 per cent completed now. It is in process of building.

Mr. SLEMP. You had a technical building underway. Did you complete that at Staten Island?

Maj. WALSH. The technical group in the Air Service consists of hangars and shops.

Mr. SLEMP. I made this statement in the hearing last year: "You have spent between two and three million dollars and you have only partially completed the work at Staten Island." Do you have any facilities for the housing of troops, or do you have any barracks there?

Maj. WALSH. Yes, sir; we have a barracks there for 200 men.

Mr. SLEMP. That is what I want to get hold of.

Mr. ANTHONY. Did you state that you had built barracks on Staten Island from some other funds?

Col. FULLER. No, sir.

Mr. ANTHONY. What type of barracks did you build there?

Col. FULLER. I can not say whether they are stucco and lath construction or brick.

Maj. WALSH. They are brick.

Mr. ANTHONY. Two-story buildings?

Maj. WALSH. Yes, sir.

Mr. ANTHONY. You showed us a type of officers' quarters that you are building. What is the rank of the officer that will live in those commanding officers' quarters?

Maj. WALSH. A major.

Mr. ANTHONY. What did it cost?

Maj. WALSH. Pretty nearly \$12,000.

Mr. ANTHONY. Who drew up the design of that building?

Maj. WALSH. The Construction Service.

Mr. ANTHONY. Of the Army?

Maj. WALSH. Yes, sir.

Mr. ANTHONY. It does not look good to me. It does not seem to me to be a good type for a military post, and it does not look like permanent construction.

Gen. MITCHELL. They are awful buildings.

Mr. ANTHONY. It looks like the type of building that a real estate agent would put up as an addition to a city with the idea of unloading it on some unsuspecting purchaser.

Mr. SLEMP. You will put in the record a complete statement of the buildings, with their cost, etc., at these different stations.

Col. FULLER. Yes, sir. We will ask the Construction Service to do so. I believe this will clear the matter a little bit in your minds: There is so much detail that possibly the general proposition was not made clear. The following are the expenditures at Staten Island, in round numbers: Land, \$420,000; allotment for construction of new buildings, \$1,289,000; and for the modification of those old structures, \$95,000. That is the total for New Dorp Field. For San Francisco the total is \$1,134,000.

Mr. SLEMP. You are in a position to house how many troops at Staten Island?

Col. FULLER. One squadron. The barracks will hold 200 men.

Mr. SLEMP. Is it expected to keep the Staten Island squadron for observation planes?

Col. FULLER. Yes, sir.

Mr. SLEMP. Is that all?

Col. FULLER. Yes, sir.

COOPERATION BETWEEN AIR SERVICE AND COAST ARTILLERY.

Mr. SLEMP. Is that what you expect to keep at San Francisco?

Col. FULLER. Yes, sir.

Mr. SLEMP. And the same at Langley Field?

Col. FULLER. For the coast-defense purposes normally there will be two observation squadrons.

Mr. SLEMP. These are enlisted men and officers that you keep at these places?

Col. FULLER. Yes, sir.

Mr. SLEMP. Are they connected with the seacoast service or the Air Service?

Col. FULLER. They are in the Air Service.

Mr. SLEMP. They are Air Service people, but they are under the control of the seacoast defense—or how does the seacoast defense connect with this?

Gen. MITCHELL. They are assigned to certain organizations. The observation squadrons are assigned to certain coast defenses, and those particular ones that work in connection with the Coast Artillery are assigned to that service. The Coast Artillery service wants a certain thing done and the Air Service carries it out. They are under the jurisdiction and control of the Coast Artillery when they are acting with them.

Mr. ANTHONY. But they are actually connected with the Air Service?

Gen. MITCHELL. Yes, sir; they are Air Service people assigned to duty with the Coast Artillery.

Mr. ANTHONY. And their reports come to the Air Service?

Gen. MITCHELL. Their tactical reports go to the commander of the coast defense to which they are assigned, but their reports in regard to supplies go to the Air Service. The supplies that are required are furnished by the Air Service.

Mr. SLEMP. Ought not the seacoast defense officers to have these seacoast aviation men under their control, so as to control and direct them as they see fit to do?

Gen. MITCHELL. No, sir; that is something that is worked out conjointly one with the other. All of our things must be hitched up one behind the other in order to get the maximum efficiency. For instance, if you take the Coast Artillery around New London, if there were a heavy artillery engagement there, we would have to put in a lot of defensive aviation in order to protect them. You might have to have more observation planes, as well as pursuit, attack, and bombardment planes. Our object in giving them observation forces at the coast artillery posts is to have it cut down to the minimum, or to give them the minimum necessary for the particular area that they cover, or in which they are to be located.

Mr. SLEMP. You are not giving them to the Coast Artillery, but they are using them.

Gen. MITCHELL. They are simply assigned for Air Service purposes with the Coast Artillery. They are assigned to do that particular work in connection with the coast defenses.

Mr. SLEMP. If it is to be for Coast Artillery purposes, why should not the Coast Artillery take over the airplanes, so that the Coast

Artillery will have control of them as an entirely independent proposition?

Gen. MITCHELL. As a practical proposition, they could not do it without giving the Coast Artillery an air service. In the first place, they could not train the pilots, and that is the very first proposition involved. Then you would have to specialize them for Artillery observation work, and that is another large proposition.

Mr. SLEMP. Is that done under the direction of seacoast officers?

Gen. MITCHELL. No, sir; all of that is under the command of our Air Service.

Mr. SLEMP. If they shoot the guns and command all branches of the armaments——

Gen. MITCHELL (interposing). Shooting the Air Service guns is one of the branches of the Air Service. In other words, the similarity between the training that they must have in order to serve in that capacity is not great, because the training in the Air Service would represent about 80 per cent of the total training.

Mr. SLEMP. Where does the Chief of Coast Artillery himself come in with regard to this matter? The seacoast defense stations ought to be responsible, it seems to me, for the entire proposition, from beginning to end.

Gen. MITCHELL. That can not be done, because this is an arm of the service that is entirely different from all others. It is entirely different from the service on the ground. There is less similarity between the Air Service and this service than between any other branches.

Mr. SLEMP. The seacoast defense service occupies a place midway between the water and the land, and I should think that it would take in the air also.

Gen. MITCHELL. No, sir.

Mr. SLEMP. However, that is your policy as you have stated it?

Gen. MITCHELL. Yes, sir; and that is the proper policy. These men assigned all along our coast are not only for the coast defenses but they would keep watch all along the coast for any enemies that may come in. It has both functions. The Coast Artillery will have the practical direction of how the operations shall be carried out in their vicinity.

Mr. SLEMP. I am not convinced myself, but I suppose that is all right. What have you to say in regard to that, Gen. Coe?

Gen. COE. There are, perhaps, as you might say, two schools of thought with regard to the Air Service and its connection with the artillery fire control in general. One is that the Air Service can be treated as another kind of transportation service. That is to say, if you want to go somewhere on the ground, you call upon the transportation service to furnish an automobile. In the same way, the Air Service might be called upon to furnish transportation in the air.

If the battery commander wants to go up in the air and still command his battery, possibly by wire methods or by radiotelegraph, he might call upon the Air Service to send him an airplane to carry him up. He might want to go to a certain place with certain relation to his battery, and from there control the battery.

Mr. SLEMP. If I were the Chief of Coast Artillery, I would not rest the fire control of the guns on some other organization.

Gen. COE. On the other hand, a battery commander can control his battery from some place on the ground. What he wants in the air is certain definite information, and in order to get that information requires special training of the observer. For the observer to perform his full function he must have the ability to determine accurately the fall of shots and report them immediately, report exactly what he sees and nothing more and nothing less, and, in addition, he must also have some training in the Air Service, in flying, so that he can be able to take charge of the plane and fly it when the pilot is disabled or for other reasons, and especially in the landing operations. The other thought has taken this view, that the commander of the battery should remain on the ground, controlling his fire upon telephonic reports as to what is happening at the target. Which of those is right, it is not yet the time to say, but we are working on the second thought at the present time.

Gen. MITCHELL. Every service in the world has tried the two thoughts that Gen. Coe has mentioned. The first one that he mentioned was tried out at the beginning of the war, and in the case of every nation it has been abandoned: it will not work practically. That is one thing which has been very definitely proved. In other words, any country will get more efficiency from a properly constituted air organization that is trained along the line indicated in the second case than it will in the other.

Gen. COE. As to the technical control, the commander of a post has control of the surgeon, although he is not responsible for the training of the surgeon.

Gen. MITCHELL. That is exactly right. The value of the Air Service along the coast will require a great deal of development.

Gen. COE. The surgeon, for instance, is under the control of the commanding officer. If he directs him to perform an operation for appendicitis on a patient, he has to do it, or take the consequences. Of course, no commanding officer would be foolish enough to tell him to do a thing like that on his own initiative. The commander might say, "Take the air," and the pilot might say, "It is dangerous," but the commander has a perfect right to order the pilot to take the air, and if he disobeys the order he does it at his peril. At the same time, the commanding officer will exercise good judgment and ask the pilot as to whether or not it is possible to go into the air. I merely cite that as being illustrative of the case.

Gen. MITCHELL. That is true.

Mr. SLEMP. By reversing that you would call on the Field Artillery to furnish and train gunners for your seacoast guns—that would be the opposite of your illustration?

Gen. MITCHELL. I do not see that, Mr. Slemp; maybe I do not understand it.

Mr. SLEMP. Are you coming along within the limit of cost as represented to the committee previously at these stations?

Maj. FULLER. As far as I know.

Mr. SLEMP. Will you have complete unit facilities at these three coast-defense stations, respectively, so that we can regard the equipment there as a complete proposition?

Maj. FULLER. Yes, sir.

EXPENDITURES FOR MATÉRIEL.

Mr. SLEMP. Have you expended any money for planes—for matériel, as you call it, airships or planes?

Gen. MITCHELL. Yes, sir.

Maj. FULLER. We have spent \$3,600,000 up to now. In 1917 the Signal Corps—

Mr. FRENCH (interposing). That is a part of the \$8,386,000?

Maj. FULLER. \$11,600,000, the total of the two appropriations. The Signal Corps spent \$1,141,750 for hydrogen cylinders. The hydrogen-generating plant was constructed at Langley Field, at a cost of \$345,081.34; two hangars for airplanes at the Langley Field, \$185,000; and for the purchase and manufacture of airplanes, \$2,600,000.

MARTIN BOMBING PLANES.

Mr. SLEMP. What kind of airplanes have you?

Maj. FULLER. Twenty Martin modified bombers, \$1,190,000.

Mr. SLEMP. That is about \$50,000 each?

Maj. FULLER. Twenty of them, nearly \$60,000 each.

Col. GILLMORE. That is with the spare parts.

Mr. FRENCH. How many have been delivered?

Gen. MITCHELL. Three have been delivered.

Mr. SLEMP. You do not expect to use any of the bombing planes in the coast defense?

Gen. MITCHELL. That type of plane was gotten out during last year to be used in connection with the coast defenses.

Mr. SLEMP. What is your attitude on the planes? Will you have different planes from the observation planes or not?

Gen. MITCHELL. This is what we want to develop for the Coast Artillery. We want airplanes that can hold the air 10 or 12 hours.

Mr. SLEMP. That is an observation plane?

Gen. MITCHELL. That is a Coast Artillery plane, working up gradually. We have some ordered. We are going to try the Martin. We want an airplane which can hold the air and carry all the heavy equipment in order to notify the Artillery organization as to what is going on, by telephone which Gen. Coe spoke of, and in addition that can carry a big weight of bombs, so, if necessary, it can attack.

Mr. ANTHONY. Is that the type of bomb that you use against ships?

Gen. MITCHELL. Probably; yes, sir. That is the reason we have ordered them. They do not have the characteristics of the Martin bombers, with only 5½ hours—the others will have 13 hours, the two big ones.

Mr. SLEMP. All of them?

Gen. MITCHELL. No, sir.

Mr. SLEMP. What size bombs will they carry?

Gen. MITCHELL. Any combination you want up to 5,000 pounds. You can cut down the gasoline and carry up to 8,000 or 9,000 pounds.

Mr. SLEMP. Does that include the personnel?

Gen. MITCHELL. Everything. On these ships [indicating] there are but two in the navigating personnel. The Martin will carry a ton of bombs, but that requires three.

Mr. SLEMP. Of course, that takes your seacoast proposition away from the observation line?

Gen. MITCHELL. No. We want to apply this to the coast artillery. you mean?

OBSERVATION AND BOMBING PLANES.

Mr. SLEMP. I am not complaining, but I want to get the thing right. You told us the other day, in the consideration of the Army bill, that there were four planes, observation planes, pursuit planes, attack planes, and bombing planes?

Gen. MITCHELL. That is correct.

Mr. SLEMP. You were asked a little while ago what kind of a plane you wanted for the seacoast defenses, and you said an observation plane?

Gen. MITCHELL. Yes, sir.

Mr. SLEMP. And you spent \$1,200,000—

Gen. MITCHELL (interposing). That is an observation plane for long distances. As a matter of fact, all observation planes carry bombs under certain conditions.

Mr. SLEMP. What is the difference between an observation plane and a bombing plane?

Gen. MITCHELL. The difference is this, that an observation plane is equipped specifically for observation. It has cameras, it has the radio, it has pistols for signaling, and all methods for working with ground troops. Where it has a little bit of reserve lifting ability we put in bombs or anything that can help it. The bombing plane is essentially a bombing plane, and everything is cut down so as to carry the maximum amount of bombs.

Mr. SLEMP. If I understand your seacoast proposition up to date, in case of disturbance you have your observation planes out to locate the enemy and also to participate in the fire, and that you take the pursuit planes to fight off the enemy?

Gen. MITCHELL. That is correct.

Mr. SLEMP. And keep some of the pursuit planes at the coast defenses?

Gen. MITCHELL. No, sir; you do not want to tie them up at any single place.

Mr. SLEMP. You would keep them with the Army?

Gen. MITCHELL. With the Air Service or Army, whichever the case may be.

Mr. SLEMP. Would you divide the bombing planes between the Army and the seacoast?

Gen. MITCHELL. No, sir. Specific bombing units should be ready for the offensive aviation. The airplane for the seacoast purpose is the observation plane, but to aid the specific work of the Coast Artillery for observation offshore these bombing planes can be constructed so as to leave off the bombs and take more gasoline for long-distance work.

Mr. SLEMP. They are very slow?

Gen. MITCHELL. No; about 110 miles an hour.

PLANES BEING PURCHASED.

Mr. SLEMP. I do not think you estimated last year for anything like that amount of money.

Gen. MITCHELL. I did not submit that estimate, as a matter of fact.

Maj. FULLER. The situation was this: The proposed expenditure which would have exhausted all of the balance of this \$11,000,000 proposition was drawn up in detail. A good part of that program fell through, except the continuance of the work at San Francisco, New Dorp, and Langley Field.

Mr. SLEMP. At no time did you gentlemen estimate for the use of this money for the purchase of any planes?

Maj. FULLER. It was not in the last year's program. If you go back to the earlier hearings on this item of \$3,600,000 you will find that it was appropriated for equipment and none of it was available for any construction, except for such construction——

Mr. SLEMP (interposing). You used this out of the \$3,600,000?

Maj. FULLER. Yes, sir. This is not taken out of the million dollars.

Mr. SLEMP. In the consideration of the Army bill this matter was gone into thoroughly and you stated the kind of planes you wanted, and have done that for several years, 1920 and 1921. You are not estimating for the next fiscal year for any money at all for equipment?

Gen. MITCHELL. No, sir; not in this estimate.

Mr. SLEMP. Suppose you need some; where will you get it?

Gen. MITCHELL. We will get it from the Army.

Mr. SLEMP. From the Army. This will be turned over to the Air Service, what you get here, and may be used for the seacoast defenses?

Gen. MITCHELL. Yes, sir; that is correct.

Mr. SLEMP. It is really an expenditure out of the seacoast defense appropriation?

Gen. MITCHELL. This other is just the other way; the Army wants supplies for the seacoast work.

Mr. SLEMP. Have you any of the bombers at Staten Island?

Gen. MITCHELL. We have some at Langley Field, nine, where we will concentrate them. They will be used in development work.

Mr. SLEMP. When do you expect to secure deliveries?

Gen. MITCHELL. There is one bomber, a little one, at Pittsburgh, and four more in the factory.

Mr. SLEMP. What are they to cost?

Gen. MITCHELL. \$375,000 for the two big ones.

Mr. SLEMP. That is, you are spending \$187,500 for each?

Gen. MITCHELL. Yes, sir; that is the experimental type, the Artillery experimental type.

Mr. SLEMP. That is not out of this appropriation?

Gen. MITCHELL. Yes, sir.

Mr. ANTHONY. They will cost \$187,500 apiece?

Gen. MITCHELL. Yes, sir.

Mr. ANTHONY. What is the life of a ship?

Gen. MITCHELL. We do not know; these large ones probably four years. They last quite a long time.

Mr. ANTHONY. They can remain in the air how many hours?

Gen. MITCHELL. Thirteen hours or more. They have six engines. This is actual development.

Mr. ANTHONY. What is such a big ship good for?

Gen. MITCHELL. It is good for surveillance over the sea and work over the water, because if one engine goes bad you can continue; that

ship can fly with four engines. In order to disable it you have to have more than two engines out of commission. In other words, it makes it possible to stay in the air a long time with a ship like that. If you run into fog and you have proper wireless, it can either be brought back to its base or it can land where there is no fog. That is the kind of navigation for heavier-than-air ships; where you will be able to stay in the air to such an extent that you do not care what happens. That is what we must develop.

Mr. SLEMP. And of the remaining ships?

Gen. MITCHELL. There are 36 of the general observation planes.

Mr. SLEMP. Where did you buy the 36?

Gen. MITCHELL. Out of this appropriation.

Mr. ANTHONY. Who makes them?

Gen. MITCHELL. The contract has been let to the Dayton-Wright Co.

Col. GILLMORE. They will practically be finished by June 30.

Mr. ANTHONY. Is that an improvement over the DH plane which you now use for observation?

Gen. MITCHELL. It has 10,000 feet more ceiling.

Mr. ANTHONY. How does it get that?

Gen. MITCHELL. By the improved motor. They have 300 horsepower.

Mr. ANTHONY. You can not get that 10,000 additional feet of ceiling with the Liberty motor?

Gen. MITCHELL. No, sir. By putting in a supercharger we can put the Liberty motor up to 25,000 feet and over. We have had it up over 30,000 feet, as a matter of fact. This new ship is about 15 miles faster.

Mr. ANTHONY. The Liberty motor is becoming obsolescent?

Gen. MITCHELL. We can use them for certain work for a long time. It is an old motor, it is a very useful motor. We are going to increase its horsepower and then we can use it for a long time with bombardment equipment and things of that sort and for observation, too. We are designing some new observation types. We will use all of those motors as far as we can.

Mr. SLEMP. And the other type?

Gen. MITCHELL. The armored attack ships are out of this appropriation.

Mr. SLEMP. Do you get other types of new equipment out of this appropriation?

Gen. MITCHELL. No pursuit ships.

Mr. ANTHONY. Who makes the attack ships?

Gen. MITCHELL. They have been ordered from the Boeing Airplane Co. on the Pacific coast, if I am not mistaken.

Mr. ANTHONY. What do you call them?

Gen. MITCHELL. The GAX. It has armor on it and eight machine guns.

Mr. ANTHONY. What do they cost apiece?

Gen. MITCHELL. The ten cost \$530,000—that is, \$53,000.

Mr. ANTHONY. What engines?

Gen. MITCHELL. Two Liberties.

Mr. ANTHONY. Can a heavy ship defend itself in the air from a pursuit plane?

Gen. MITCHELL. No; no ship can.

Mr. ANTHONY. You have to rely on these pursuit planes to keep them off?

Gen. MITCHELL. Yes, sir. We use those ships for observation purposes. We put them up as high as they will go and we observe with them over the water and over the land. After they are picked up by the other people, unless by a fixed patrol already up in the air, the enemy has to climb up to their height before the attack is made. That is their protection. They get their information by stealth, in other words.

Mr. ANTHONY. In the case of a fight you have to have these smaller ships to go up higher?

Gen. MITCHELL. Yes, sir. I think myself that it is wrong to charge these things except to one appropriation. It complicates everything. If Gen. Coe wants observation airplanes for his outfits, they ought to be furnished hereafter from the general appropriation.

AIR SERVICE IN COAST DEFENSE.

Mr. SLEMP. The Air Service will take both the land and sea under its control?

Gen. MITCHELL. I knew you would ask that question, so I drew this diagram. Here is the whole proposition. Here [indicating] is America, and here [indicating] is Europe. The first thing to do is to put out the airships and to observe what is coming across from Europe.

Mr. ANTHONY. On the European coast?

Gen. MITCHELL. Certainly; immediately. The next thing is the fleet, with its airplane carriers. The air force acting from carriers will be a very small part of the whole aviation. The next proposition is observing along our coasts for hostile air forces or shipping. They should keep the hostile forces constantly under surveillance until the action of the guns becomes necessary. At the same time the information that these observation planes pick up should be transmitted back to the offensive aviation that should be in a position where it can act most quickly. Here [indicating] is Boston, and here [indicating] is the Chesapeake Bay, and they cover that area [indicating]. That is the most important area in the United States. This bombardment can be used with the offensive aviation.

Mr. SLEMP. From what height do you propose to drop the bombs?

Gen. MITCHELL. As low as we can go to get away from the blast.

Mr. SLEMP. What would that be?

Gen. MITCHELL. In case of 25 pounds we will come down to 100 feet, and in case of a bomb up to about 500 pounds we will stay about 1,000 feet.

AIRPLANES VERSUS BATTLESHIPS.

Mr. SLEMP. Would it not be a good idea to demonstrate first whether you could hit the battleships from an altitude that would be free of antiaircraft fire?

Gen. MITCHELL. No, sir. When we go into battle we go in for effect, taking our losses as they come.

Mr. SLEMP. They claim it would be.

Gen. MITCHELL. The thing to do is to thoroughly investigate it.

Mr. ANTHONY. Some of us on the committee rather doubt your ability to hit a battleship from a height that is beyond the reach of an antiaircraft fire.

Gen. MITCHELL. Of course, we have an accurate range for our projectiles, which we know just as artillery has, and if you want to put a ship completely out of range, where it can not be touched, then you make the problem impossible of solution.

Mr. ANTHONY. Could you hit a battleship from an altitude of 10,000 feet?

Gen. MITCHELL. We can with collective bombardment; yes; but we have got to attack by wing of 300 ships, as we did in Europe, and we will deluge the whole fleet at once. But nobody will ever attack at that altitude over the water, because it is not an economical thing. If we attack at a low altitude you can assign any percentage of loss you want to; suppose you assign a loss of 50 per cent, or even 75 per cent, and we land two or three projectiles on those big ships; they are "goners," and you have not lost as many men as you have lost on the big ships. Let me elaborate a little bit on what Mr. Anthony says. We want to develop our methods of attack against the destroyer; we want to develop our methods of attack against a supply ship, because if a battleship is deprived of both of those things it will be very much crippled in its ability to do anything, and, last, we want to attack a ship with the big projectiles in order to see when, where, and how they should be handled. Now, nothing of that kind has ever been done.

Mr. FRENCH. I am impressed with the importance of the Air Service, but it does not seem to me that a test which would be provided by permitting the Air Service to attempt to destroy a ship, or see what it could do by dropping bombs on ships, would be complete unless it were met by a condition that we would regard as inconceivable; that is, for your force in the air to be met by a force which would be just as much in dead earnest to see to it that you did not reach the ship.

Gen. MITCHELL. Well, the question is that you have to admit that you have control of the air, or you can not come to any conclusion on the thing at all.

Mr. FRENCH. You can not assume that, because that is simply going to be one of the chances of the battle. I realize that if you have control of the air you can then come down and drop bombs on a battleship, but it seems to me that so far as the test has to do with striking a target, that can be tested out just as well without turning over a battleship, so far as the effectiveness of a shell that is dropped is concerned. My idea is that that can be tested practically as well with some other sort of a target.

Gen. MITCHELL. How?

Mr. FRENCH. Why, we know the effect of explosives.

Gen. MITCHELL. No; we do not; and that is just the point. We have many other weapons for the attack of a battleship the value of which needs to be proved and then developed.

Mr. FRENCH. I do not think it is, no matter what anyone else says. I think you do not recognize that there will be a contending force

and that you have got to overcome that before you can have an opportunity to try the experiment.

Gen. MITCHELL. I have always recognized that; in every bit of testimony I have ever given here it has been prefaced on the fact that you must obtain control of the air, and I have always said that your Air Service must be based on what can be brought against it, and you must have sufficient control in the air in order to be able to operate in the air. In Europe we used our bombardment aviation all the time and took our losses, and the same would be the case with any attack on the water. We want these targets because no aerial bombs have been tried out on actual targets. We want it in the same way that gunfire is practiced by a navy against a target or by the Coast Artillery against a target. Why should we, an arm of the Government that is charged with the defense of the coast, among its other duties, be deprived of the same targets that other people have? You can preface that on anything you want. The Coast Artillery, if they were shot out of position by an opposing force, could not shoot another gun, and the Navy, if it were put out of commission, could never shoot another gun, so that you must come to some arrangement as to how to develop your armament for a specific attack of certain things, and without practice on actual things you can not get as much effect as you can with them.

Mr. FRENCH. I think you are carrying the illustration altogether too far. If we wanted to carry it in other lines just as far as that, we could kill a man by gas through the use of a certain defective mask in order to prove that the mask was defective, and we could carry it to all sorts of lengths. I am willing to concede so much of worth to the Air Service as to be willing to give most generously for it, but I do not think there is any use, or that it would be a fair test, in providing the type of test you suggest. I do not think it is a fair test.

Gen. MITCHELL. What test would you suggest, then?

Mr. FRENCH. I do not think we should come to a test that would be effectual and completely clinch your argument in order to justify us in making liberal appropriations. A test that would be complete and would meet the issue would be a test that is inconceivable.

Gen. MITCHELL. In time of peace, how are you going to test out, as far as possible, the offensive weapons you have?

Mr. FRENCH. We can not absolutely do it any more than we can test out the efficiency of a gas mask without putting the lives of people in jeopardy.

Gen. MITCHELL. Of course, they test them out on animals, as far as gas is concerned, and in testing out any material thing we come as close as we can to the problems we will have to confront in the case of war. Let me say a little more. You brought up the question of control of the air. We should, from our coast positions in this country, certainly be able to control the air over anything coming over on aircraft carriers.

Mr. FRENCH. You would always control the air when the fight is near our coast, but you would not when the fight was remote?

Gen. MITCHELL. We are only talking now from the standpoint of coast defense—at least, that is the standpoint from which I am talking—and we are not talking about fighting across the water. As I

said a moment ago, the number of enemy airplanes is reduced in accordance with the capacity of the airplane carriers, but we should be able to obtain predominance over any airplane carriers coming against our coast; then, after that, it is a question of making a direct attack on their shipping, and we can attack with the means we now have if developed up to about 200 miles off the coast. What we want to do is to be allowed to develop our air attacks on shipping, and we believe that development should come through the use of the most perfect targets we can get in that respect, and such targets consist of armored and unarmored vessels. Such a test has never been tried in this country, and without it I do not see how you can develop it.

PROCUREMENT OF PLANES UNDER ESTIMATES.

Mr. SLEMP. You are not asking for any new planes out of this appropriation for next year?

Gen. MITCHELL. No, sir.

Mr. SLEMP. But you are going to spend some of the money you get from the Army appropriation act for such planes as can be utilized in your coast-defense work?

Gen. MITCHELL. Yes.

Mr. SLEMP. And that includes the different classes that you described in the Army hearings?

Gen. MITCHELL. Yes, sir.

EXTENSION OF APPROPRIATION.

Mr. SLEMP. We have a letter from the Secretary of War in which is asks for the extension of \$688,000 beyond the fiscal year 1922. Is it a part of the \$3,200,000 that you have mentioned as lapsing?

Col. FULLER. It is a part of the \$2,600,000 spent for aircraft.

Mr. SLEMP. But it is not a part of the \$3,200,000 which you say will lapse?

Col. FULLER. No, sir.

Mr. SLEMP. That would also lapse, making about \$4,000,000 which would lapse if it were not allowed?

Col. FULLER. Yes, sir.

Mr. SLEMP. This letter refers to contract 274, June 28, 1920, with the Dayton-Wright Co., for \$536,890.10; contract 277, June 9, 1920, made with the Glenn L. Martin Co., for \$1,192,607.81; and contract 279, June 23, 1920, made with the Wittmann-Lewis Aircraft Co., for \$375,000. Have you any statement to make about those contracts?

Col. GILLMORE. When these contracts were made, Mr. Slemp, the Air Service did not realize that this money would not be available after June 30 of this year. We went on the supposition that if it were obligated prior to June 30, 1920, as the law said, that we were fulfilling the law. There is a difference of opinion among some people who have looked at the appropriation, but the Chief of Finance has given us an official opinion that no money can be expended out of that appropriation after June 30 of this year. Now, these three contracts will not be finished and paid for by June 30 of this year. If the committee does not extend it, it will bring us into a claim for damages that will probably amount to nearly the entire sum asked for, for the reason that the material has been pur-

chased that goes into the ships, and it would only be the difference between the labor that would be performed after June 30 of this year.

Mr. ANTHONY. Did your contract specify a time for delivery?

Col. GILLMORE. Yes; the contract specified a time for delivery, but we have made several changes in the ships, Mr. Anthony, that have delayed the contractor.

Mr. ANTHONY. Has the War Department ever let a contract for construction in which it has not made changes and invalidated the contract? I have never known of one. What is the use of making contracts if they are immediately invalidated?

Col. GILLMORE. Well, I think it is very desirable to make changes in the construction of aircraft of this character. If in your experimental work an improvement is obtained that it will be to the best interests of the Government to have on the ship, I think it would not be wise to go ahead and not get that improvement on that type of plane.

Mr. ANTHONY. I refer, for instance, to the contract we made for the construction of 3-inch field guns at the beginning of the war, in which there were some four hundred and odd changes made from the time the contract was let and which delayed the production of those guns. The same is true as to contracts made for the Spad type of airplane; the contractor claimed that there were so many changes made that it was impracticable to get started on it.

Mr. SLEMP. Do you expect to get deliveries during the fiscal year 1923?

Col. GILLMORE. These will be delivered. The observation planes, the Martin planes, and one of the bombers will probably be delivered by June 30.

Mr. SLEMP. All of those?

Col. GILLMORE. Yes, sir; most of them, but they will not be delivered in time to pay for them, and it will take the remaining fiscal year to get them all. While it is bad business sometimes to make changes, yet in aircraft of this character——

Mr. SLEMP (interposing). You know you have had this money since 1919.

Col. GILLMORE. If you will make this extension, we can absolutely promise that there will be no further extension asked for of this money.

Mr. FRENCH. Your judgment is that the loss by way of damages, if we do not grant the extension, would practically be as much as the cost if the extension should be granted?

Col. GILLMORE. Yes, sir; and then we would not get the equipment.

Mr. ANTHONY. Would we be better off not to have the planes or better off if we got them?

Col. GILLMORE. This represents the very latest type of development in connection with this kind of plane, and I believe we would be better off. I believe that anyone who studied the character of these planes would agree to that.

Gen. MITCHELL. It really is a very remarkable ship, Mr. Anthony, as far as we can tell until we actually fly it.

Mr. ANTHONY. Do you think of anything else on that item?

Col. FULLER. There are miscellaneous items out of that amounting to \$283,000, cleaning up the \$3,600,000. Many of those expenditures were made in 1917 and they were covered in the hearings last year.

Mr. SLEMP. What else have you under the Air Service?

DETAILS OF ESTIMATE.

Col. FULLER. I think the next thing in orderly procedure would be to take up these items of real estate.

Mr. SLEMP. Colonel, you were going to make a brief statement in reference to the tracts of land at Boston, Narragansett Bay, Long Island, and Puget Sound.

LAND FOR LONG ISLAND SOUND.

Col. FULLER. The estimated cost of the land for the station for Long Island Sound is \$27,500.

Mr. SLEMP. How much land do you get for that?

Maj. WALSH. One hundred acres.

Mr. SLEMP. How far is that from your permanent post?

Col. FULLER. That is across on the mainland from Forts H. G. Wright and Terry.

Maj. WALSH. It is only about a mile or 2 miles, possibly, from Fort H. G. Wright.

Mr. SLEMP. Have you looked up the assessment valuation on this property?

Col. FULLER. Those details are charged to what was the old real estate service, now the Quartermaster General's Office, and there is a representative here, Mr. Turton.

Mr. TURTON. No, sir; the assessed valuations on these coast-defense stations have not been obtained for the reason that our experience in the acquisition of real estate for all these war-time projects has been that the assessed valuation bears absolutely no relation in the world to its sale value.

Mr. SLEMP. How do you determine the value of these tracts?

Mr. TURTON. The valuations are determined by appraisals by local representative men, and also by representatives from our own division, jointly.

Mr. SLEMP. How much time do you spend at the various places?

Mr. TURTON. I was not there myself, personally, at these stations.

Mr. SLEMP. Who was your representative?

Mr. TURTON. These options and offers to sell were obtained by Mr. McDonald.

Mr. SLEMP. Is he a member of the War Department?

Mr. TURTON. Oh, yes.

Mr. SLEMP. Did he get all of these offers?

Mr. TURTON. Yes, sir.

LAND AT NARRAGANSETT BAY.

Mr. SLEMP. What about Narragansett Bay?

Col. FULLER. There are three parcels there at an estimated cost of \$69,000.

Mr. SLEMP. Give the number of acres, the location, etc.

Col. FULLER. One hundred and thirty acres of a heavier-than-air station, at an estimated cost of \$50,000; 10 acres of land for a lighter-than-air station, at \$16,000; 3 acres at an estimated cost of \$3,000.

Mr. SLEMP. I thought you said the lighter-than-air stations had been provided.

Col. FULLER. Except at Narragansett Bay.

Mr. SLEMP. Is that the cheapest land available in that section?

Col. FULLER. And satisfactory for the purpose. This board of officers went around and selected the sites and took into consideration the suitability.

Mr. SLEMP. And that was followed by your real estate section getting the options and offers of sale?

Col. FULLER. Yes, sir; and so far as the details are concerned we do not go into that further.

LAND AT BOSTON.

Mr. SLEMP. How about Boston; how many acres do you get there?

Col. FULLER. Eighty-five acres for a heavier-than-air station, \$351,475; coast defenses of Portland, Me., 130 acres for a heavier-than-air station—

The CHAIRMAN. That is a rather high price for the land near Boston, \$4,000 or \$5,000 an acre.

Col. FULLER. Yes; and that being the case the Air Service has had several inspections made for the purpose of satisfying ourselves whether there is any other site suitable for the purpose. This is on Boston Harbor and we have satisfied ourselves absolutely that there is no other place that would serve the purpose.

LAND AT PORTLAND, ME.

Mr. SLEMP. The next is Portland Harbor, Me.

Col. FULLER. Portland Harbor, Me., 130 acres for a heavier than air station, \$88,750; coast defense of Puget Sound, 290 acres for a heavier-than-air station, \$60,000.

Mr. SLEMP. Are all these stations in close proximity to the forts and batteries they serve?

Col. FULLER. Yes, sir; they are.

DISTANCE OF AIR STATIONS FROM BATTERIES

Mr. SLEMP. What is the longest distance from these batteries of any of these land stations?

Col. FULLER. Probably the one at Long Island Sound across on the mainland is probably as far away as any.

Mr. SLEMP. How far is the Boston Harbor station from the fort?

Col. FULLER. The nearest fort would be Fort Andrews which, I would say, is perhaps 2 or 3 miles.

Mr. SLEMP. It could be 2 or 3 miles, is that right?

Col. FULLER. Yes.

Mr. SLEMP. And therefore you are getting a station on a piece of cheaper land.

Col. FULLER. But it is not in the water, is it?

Mr. SLEMP. I have not yet seen the necessity for its being on the water's edge.

Col. FULLER. For the seaplanes.

Mr. SLEMP. There is no suggestion about that at all. You do not have seaplanes in the seacoast defenses.

Gen. MITCHELL. We have some on hand now.

Mr. SLEMP. But there is no necessity for that?

Gen. MITCHELL. For peace time operations over the water it is a good thing to have them.

Mr. SLEMP. I should think you gentlemen ought to revise your proposition and see if you can not get cheaper land.

Gen. MITCHELL. That has been gone over for a good many years, and if you are going to put an airdrome in that vicinity, that is about the best proposition.

Maj. WALSH. There are \$126,000 worth of improvements on that piece of ground at Boston. There are two large barns and a farmhouse there which can be converted and used.

Mr. SLEMP. I might add that at all these stations you will probably have to spend anywhere from one to two million dollars to get your station in good condition to receive troops, etc., in addition to the planes.

Col. FULLER. It is not proposed to place construction here under the present plan. The one advantage of the Boston site is that it is now practically ready for use, so far as the land is concerned.

Mr. SLEMP. How would you house troops there?

Col. FULLER. As Gen. Mitchell explained, the squadron would go in there for use when required in the summer by the Coast Artillery.

Mr. SLEMP. If you have only \$126,000 worth of buildings there and at these other stations you require \$1,000,000 to get the same equipment, one or the other is wrong.

Gen. MITCHELL. We are contemplating field-service facilities only there now. What we want to do is to cut down overhead as much as possible and concentrate in these central positions. I am now speaking of peace time. Then when the exercises are conducted by these various organizations for coast defense, to throw the squadrons in there at that time and allow them to practice with them, the personnel living in tents or any other place they can. In time of war or threatened war, then the units would be put with them all the time.

Mr. SLEMP. In time of war, in firing these guns, you would condemn whatever area you wanted.

Gen. MITCHELL. Yes; but in time of peace you must have airdromes around there, otherwise the air force can not work in those areas.

Mr. SLEMP. My point is that you could locate them somewhat farther back and accomplish practically the same results.

Gen. MITCHELL. I do not think you can. These boards were pretty careful about that. The point is that we are trying to keep down the overhead as much as possible on that proposition.

AVIATION, SEACOAST DEFENSES, HAWAIIAN ISLANDS.

Mr. SLEMP. The next item is for the establishment, construction, enlargement, or improvement of aviation stations for use in connection with the seacoast defenses of the Hawaiian Islands. You are

requesting \$1,079,000. You had an appropriation of \$1,300,000. What are your balances and your explanation of the expenditures?

Col. FULLER. The current appropriation was \$1,300,000 and the obligations and reservations \$1,287,350; balance, \$12,650. The expenditures made and contemplated under the current appropriation will provide in general for the following permanent construction: Luke Field, quarters for 12 married officers, 16 bachelor officers, and 6 married noncommissioned officers——

AIR FORCE IN HAWAIIAN ISLANDS.

Mr. ANTHONY (interposing). How large an air force do you maintain in the Hawaiian Islands?

Col. FULLER. Over there now there are two observation squadrons and two balloon companies. It is necessary to send over there one air park for maintenance, and eventually a pursuit squadron, out of the 16,000 allotment of personnel, and a group headquarters and photo section.

Mr. ANTHONY. How many officers and how many enlisted men?

Col. FULLER. Seventy-five officers and 709 enlisted men.

Mr. ANTHONY. Are there that many there now?

Col. FULLER. That exact number are not there now. There are 29 officers and 594 men now there.

Mr. ANTHONY. How many planes would that be?

Col. FULLER. Fifty-two planes; two squadrons.

Mr. ANTHONY. And how many balloons?

Col. FULLER. Each company mans normally one balloon.

Mr. ANTHONY. Is not that a pretty large number of officers and men and matériel to put on one little island?

Col. FULLER. The balloon companies are not on Fords Island.

Mr. ANTHONY. I mean on Ford Island or Oahu.

Gen. MITCHELL. That is entirely a question, Mr. Anthony, of the amount of defense you want to give around there. They have figured out the necessity for these two observation squadrons to work with the troops and with the Coast Artillery in the vicinity of Honolulu.

Mr. ANTHONY. With how many troops is it proposed that this force should work?

Gen. MITCHELL. The idea is to have a division of troops there.

Mr. ANTHONY. That would be 19,000 men?

Gen. MITCHELL. Yes, sir; according to the last organization, approximately 19,000 men; but in so far as the air is concerned, it has to work for artillery and for reconnaissance purposes and for liaison, and you have those three elements, and the size of the organization does not vary in the air.

Mr. ANTHONY. Have you enough troops there to go with a division of men?

Gen. MITCHELL. Yes, sir; we have enough for the observation work with troops of Artillery and Infantry and Cavalry that are on the islands, and for the carrying out of the adjustments of fire for the Coast Artillery.

Mr. ANTHONY. How many air posts have you built on the island?

Gen. MITCHELL. One.

Mr. ANTHONY. Where is that?

Gen. MITCHELL. At Ford Island. There is no pursuit there and no bombardment aviation for the defense of the island.

Mr. ANTHONY. Are all your air troops located on Ford Island?

Gen. MITCHELL. Yes, sir; except the balloons.

Mr. SLEMP. The Navy has a station on that same island?

Gen. MITCHELL. They are on the same island, and an arrangement has been made whereby a line has been drawn between the two and the work is separated in that way.

Mr. ANTHONY. Has the Navy any aviation on Oahu?

Gen. MITCHELL. Yes, sir.

Mr. ANTHONY. How much?

Gen. MITCHELL. A detachment.

Maj. WALSH. They have not anything established there yet. The station is just being built.

Col. FULLER. There is just a small detachment over there.

Mr. ANTHONY. If a full division of troops were not stationed there there would not be the necessity for all this air force, would there?

Gen. MITCHELL. Yes, sir; if you have any troops at all which involve Infantry and Artillery, the size of it would not make much difference, because you have to carry out your adjustments in the air, and that takes so many no matter what the number of ground troops may be.

Mr. ANTHONY. You say you want some pursuit planes over there: who are you going to pursue with them?

Gen. MITCHELL. The same enemy that attacks the island.

Mr. ANTHONY. I can not see how any plane can get over to Hawaii.

Gen. MITCHELL. That brings in another question. If you do not need to protect the island, of course, you do not need troops there.

Mr. ANTHONY. I can see how you might need observation planes to direct fire against an enemy fleet. I can see how a hostile fleet can get there.

Gen. MITCHELL. Well, suppose a hostile fleet lies off and sends its airplanes over from airplane carriers, what are you going to do?

Mr. ANTHONY. I do not know of any hostile fleet that has any airplane carriers.

Gen. MITCHELL. Some powers have; others are providing them.

EXPENDITURE OF CURRENT APPROPRIATION.

Mr. SLEMP. How did you spend the \$1,300,000 that was appropriated last year?

Col. FULLER. At Luke Field, quarters for 12 married officers, 16 bachelor officers, and 6 married noncommissioned officers, \$177,000; barracks for two squadrons, \$80,000; four small warehouses, \$40,000; erection of three hangars and miscellaneous buildings, \$77,000; partial construction of motor repair shop, \$25,000; part of municipal work incident to the establishment of permanent station, \$203,995; part of distribution system and emergency water supply, \$157,005; total, \$760,000.

Mr. SLEMP. You spent \$760,000 at Luke Field?

Col. FULLER. Yes; and at Fort Kamehemeha and Fort Ruger we will have at each place quarters for three married officers and four

married noncommissioned officers' quarters, \$103,000; barracks for one balloon company, \$100,000; balloon hangars, \$50,000; part of municipal work, \$276,000; a total of \$529,000 for the two stations; grand total, \$1,289,000 for the Hawaiian Islands.

WATER-SUPPLY SYSTEM.

Mr. SLEMP. Last year you told us one of the principal needs there for money was on account of your lack of water; that the boys had to drink brackish water; and that you were going to a lot of expense in piping and pumping and getting water from long distances and going over lagoons, and all that sort of thing, and yet you do not seem to have spent any money for that at all.

Col. FULLER. Yes, sir; \$157,000 is to be spent on that.

Mr. SLEMP. Have you a complete supply of fresh water there now?

Col. FULLER. It is being installed. It is a joint project with the Navy.

Mr. SLEMP. Did we spend \$157,000 and the Navy \$157,000 on that project?

Maj. WALSH. No, sir. The situation is as follows, to bring the water to the point of distribution for the Army and the Navy local distribution systems, the total cost is about \$160,000. That means \$80,000 apiece, and then the remainder of that \$157,000 is taken up in the local distribution system of the Army on Ford Island, leading the water to the various buildings and quarters.

Mr. ANTHONY. Is the Ford Island water plant supplied from Fort Kamehameha?

Maj. WALSH. The present emergency system is to tap the existing Fort Shafter-Kamehameha line near the naval reservation, runs across the reservation, and then through a submarine line to Ford Island to the distributing point. We will draw water from the same source as Fort Kamehameha under the emergency system.

Mr. ANTHONY. Fort Kamehameha wants an additional appropriation to extend their water facilities.

Maj. WALSH. Yes, sir; that is the permanent system, and this emergency system which we are putting in comprises two portions of that permanent system or two of the links in that permanent system, so it jibes in with the permanent system which is to be installed.

Mr. ANTHONY. Do you get your water on Ford Island from wells?

Maj. WALSH. At present we get it from three or four artesian wells.

Mr. ANTHONY. But you propose to go to the main island?

Maj. WALSH. We have to, sir. The salt content of that water is now almost twice what it should be and still have it fit for human consumption.

HOUSING FOR TROOPS.

Mr. SLEMP. You also stated last year that the officers and men were in tents and that you wanted to put them in quarters. Have you officers' quarters and barracks for the enlisted men and officers, respectively?

Col. FULLER. No, sir; only partially so. The estimate before you now is for the completion of that work.

Mr. SLEMP. How many enlisted men have you there? You want one squadron and that is all you are expecting there?

Col. FULLER. At Luke Field, two squadrons, an air park, a photo section, and group headquarters.

Mr. SLEMP. How many enlisted men?

Col. FULLER. The total to be provided for is 509 enlisted men, deducting the two balloon companies.

Mr. SLEMP. How many have you there now?

Maj. WALSH. We have the two observation squadrons and the photo section and the group headquarters. The air park——

Mr. SLEMP (interposing). Making how many?

Maj. WALSH. Approximately 390.

Mr. SLEMP. How are you housing them?

Maj. WALSH. We are having constructed under this appropriation barracks to provide for the two squadrons that are over there now. At present, pending the completion of those buildings, they are in some emergency wooden-type affairs and under tents.

Mr. SLEMP. Will what you are now building out of past appropriations take care of the men you have there now?

Maj. WALSH. Yes, sir; but not the air park, which it is very essential should be sent there.

Mr. SLEMP. I am talking now about barracks and quarters to take care of the men you have there, both enlisted men and officers.

Maj. WALSH. It will, perhaps, not take care of all the officers, Mr. Slemp.

Mr. SLEMP. How many officers have you there now?

Gen. MITCHELL. Twenty-nine officers; but this strength is much below the authorized strength and will be increased very shortly.

Mr. SLEMP. And how many officers' quarters have you?

Gen. MITCHELL. About 28.

Mr. SLEMP. And you have what might be called your post facilities—that is, a general administration building, a garage, and post exchange—is not that already provided for out of your \$700,000?

Col. FULLER. No, sir; coming down to the detail of what will be provided from the funds heretofore appropriated, there will be 12 married officers' quarters and 16 bachelor officers' quarters and 6 married noncommissioned officers' quarters.

Mr. SLEMP. That is 34 out of the 36 which you said you needed.

Maj. WALSH. No, sir; only 28 officers' quarters; the other 6 are noncommissioned officers' quarters.

Col. FULLER. The air park, which is not over there now, is an essential part of the garrison for the repair and care of equipment.

Mr. ANTHONY. Is an air park like an artillery park?

Gen. MITCHELL. The air park is the organization used to keep up the equipment and repair it.

Mr. ANTHONY. If we did not want an air park over there, the best way would be not to provide for it in this bill.

Gen. MITCHELL. That is very true, but then you would have to ship the equipment back to San Francisco and send it to a repair depot in the United States for repairing, and the deterioration in overseas shipment is very great.

Col. FULLER. Also, the number of officers over there now is only a part of the normal complement of those two squadrons.

Mr. ANTHONY. You said a few moments ago that you had one air post there and that is called Luke Field.

Col. FULLER. Yes; one heavier-than-air station.

Mr. ANTHONY. You are also asking money for construction of officers' quarters at Fort Ruger.

Col. FULLER. For a balloon company and at Fort Kamehameha for a balloon company.

Mr. ANTHONY. Will you have officers and enlisted men of the Air Service at each one of those places?

Col. FULLER. Yes, sir; they are there now.

Mr. ANTHONY. What is the necessity for having them scattered around in that way? These places are all very close together.

Col. FULLER. That makes one balloon base line from Ruger to Kamehameha, and it is at each of those places that the balloons will be operated.

Mr. ANTHONY. In time of necessity, could you not move your men and your balloons from Fords Island over to Ruger or Kamehameha, if you wanted to use them there?

Col. FULLER. No, sir; that would not be practicable and that would be a more expensive course.

Mr. ANTHONY. Why? Are not these balloons portable?

Col. FULLER. The balloons are portable, but they will drill every day with the Coast Artillery in their normal work.

Mr. ANTHONY. How portable is a balloon; how long does it take you to transfer it 5 or 6 miles?

Col. FULLER. Inflated, that would depend upon the nature of the obstacles. The electrical wires, power lines, and so on, would cause some delay.

Gen. MITCHELL. Those two points are on opposite sides of the island there, Mr. Anthony.

Mr. ANTHONY. Yes; but I do not see why you could not take a balloon and deflate it and put it in a truck and carry it within a radius of a few miles, and then inflate it and put it up again. The Army can do that.

Gen. MITCHELL. The cost of hydrogen over there is pretty high.

Col. FULLER. Yes; it would be more expensive, and then it is necessary to have these balloon companies right there with the Coast Artillery, and when they go to drill these people can drill with them every day.

Mr. ANTHONY. Of course, if you go ahead and provide balloon stations at every Coast Artillery station and station aviation officers and aviation troops there, you are going to build up a duplicate Military Establishment in the end.

Col. FULLER. I think I see what Mr. Anthony has in mind.

Mr. ANTHONY. And I can see the way you are heading also.

Col. FULLER. We are not putting in a new overhead. We are taking the Kamehameha and the Ruger overhead—

Mr. SLEMP (interposing). How do you take care of the officers and enlisted men at Forts Kamehameha and Ruger?

Col. FULLER. They are in the same condition now that they were last year.

Mr. SLEMP. That is, they are in tents?

Maj. WALSH. They may be housed in some of the temporary buildings erected during the war.

Mr. SLEMP. Why can they not remain there?

Maj. WALSH. Possibly because the temporary buildings are falling apart.

Mr. SLEMP. Have you had any report on that?

Maj. WALSH. No, sir; but just judging by temporary structures everywhere else.

Mr. SLEMP. We have been told that those temporary structures would last from 5 to 10 years and by using a little paint you would get them in very good shape.

Maj. WALSH. I do not know, myself, exactly the type of temporary structure they have over there.

Mr. SLEMP. What does the commanding officer there in making this request, report about the present housing conditions?

Maj. WALSH. That these permanent barracks are needed.

Mr. SLEMP. What is his description of the present housing?

Maj. WALSH. I have not got that.

Gen. MITCHELL. These estimates have been furnished by the commanding general over there, as a matter of fact.

Mr. SLEMP. Have you given us a complete list of what you have done with this money?

EXTENSION OF APPROPRIATION.

Col. FULLER. Yes, sir; and we are asking that this \$1,300,000 be continued and made available for another fiscal year for the reason that the commanding general reports that it will cost about 25 per cent more to do this work by contract than it will to do it by purchase and hire, and he naturally desires to do it in the more economical way.

Mr. SLEMP. Is it \$103,000?

Col. FULLER. \$1,300,000. We ask to have that continued and be made available during the next fiscal year.

Mr. SLEMP. Is this \$1,079,000 part of that \$1,000,000?

Col. FULLER. No, sir; it is in addition.

Mr. SLEMP. You are asking \$1,079,000 in addition to the other?

Col. FULLER. Yes, sir.

Mr. SLEMP. How much of the \$1,300,000 will not be spent this fiscal year?

Col. FULLER. The construction service can give that information, perhaps.

Gen. CARSON. Of the \$1,300,000 appropriated in the current bill that we are operating under we have obligated for construction work at the posts under discussion a total of \$1,262,000, leaving a balance of \$38,000 that we will want to use for contingencies that may occur in connection with the work. As stated by Col. Fuller, the work in Hawaii must necessarily be done by purchase of material and hire of labor. It can not be done otherwise, and, that being the case, such as we can not actually expend up to the end of the fiscal year automatically goes back into the Treasury. If the work were done by contract, that figure would not bother us.

Mr. SLEMP. How much of that do you expect to be a hangover?

Gen. CARSON. Approximately \$38,000, if our plans are carried out.

Mr. SLEMP. You would only save, according to that, 25 per cent of \$38,000.

Gen. CARSON. If we finished up by June 30, but we have no contract. We are doing it by hire of labor and purchase of material; and the work can not be completed before June 30.

Mr. SLEMP. How much had you actually expended to the 1st of January?

Gen. CARSON. I can not give that figure offhand.

Mr. SLEMP. What is the date of the last report you have?

Gen. CARSON. The last report we have, which carries it to January 1, shows that the amount actually disbursed for Luke Field was \$14,602.03, and the amount obligated was \$69,670.49.

Mr. SLEMP. What about Fort Ruger and Fort Kamehameha?

Gen. CARSON. As to Fort Kamehameha, there is no amount reported as actually disbursed.

Mr. SLEMP. According to that, you have nearly all of that \$1,300,000 still in your hands?

Gen. CARSON. At Fort Ruger, \$2,629.86 has been obligated and \$95.20 actually disbursed.

Mr. ANTHONY. There are no contracts out against that money?

Gen. CARSON. No contracts for material, probably.

Mr. ANTHONY. Who would buy that material?

Gen. CARSON. That is purchased by the construction quartermaster in charge of that district.

Mr. ANTHONY. He can not buy it without having the money allotted?

Gen. CARSON. The money has been allotted, and it is at his disposal. He is carrying out the work under approved plans, specifications, and estimates.

Mr. SLEMP. Are there likely to be any quarters built during this fiscal year?

Col. FULLER. Yes, sir.

Mr. SLEMP. We have not completed any of these?

Maj. WALSH. The construction first started at Luke Field, the work at Fort Ruger was to immediately follow it, and Fort Kamehameha came some time after that.

Mr. SLEMP. You had some war funds that you were using over there for this purpose, and that \$300,000 was a hangover from war funds. You are not accounting for the war funds at all.

Col. FULLER. That was \$302,000.

Mr. SLEMP. But we reappropriated it. I still do not see where you stand at all.

Col. FULLER. The situation, as I understand it, is this, that a very small portion of the work has been done and a large portion of this balance remains. Now, on what we are able to do between now and June 30, depends how much of this fund we would ask to have continued for the Air Service. We do not know just how much will remain, and we ask that the unexpended balance be continued.

Mr. SLEMP. In case you should be delayed and could save at least 25 per cent of the money to be expended, would it not be better for the committee not to make any additional appropriation and let you take your time and work the thing out and then come back next year with a more or less complete proposition? I do not see from your statement any vital necessity for any more money.

Gen. CARSON. If we could rely on promptly getting appropriations for the work, it would be very well, but what we do not get now we

can not get until this time next year, and in the meantime we will finish up work that we have on hand and there will be an interval.

Mr. SLEMP. We gave you in the last bill \$1,300,000, and six months later we find that you have expended of that amount a very small portion.

Gen. CARSON. That is true; but the appropriation does not become available until the 1st of July. The last appropriation bill did not pass until the latter part of the fiscal year 1920, and we did not know what would be available or what would be done until the 1st of July. It takes time to perfect the plans and get the work started.

Mr. SLEMP. Can you send a cablegram over there and find out about this?

Gen. CARSON. While there has been apparently a small amount of money actually expended, or had been up to December 31 last, in the next six months we may spend all of it if we speed up the work.

Mr. SLEMP. You would not spend it if it involved 25 per cent additional expense. That would amount to \$250,000.

Maj. WALSH. That is what we are trying to avoid.

Col. FULLER. The commanding general has cabled that in order to take advantage of this more economical method, it is absolutely essential that the funds be continued.

Mr. SLEMP. That is all right.

Maj. WALSH. The delay in getting started was due somewhat to the fact that the plans as submitted to the committee last year called for more money, and in order that we might proceed in a logical and economical way, it was necessary to refer the matter over there again for revision to meet the lesser amount appropriated.

Mr. SLEMP. There is no criticism of that at all. From your testimony, the situation appears to be that you will be able to house and quarter and furnish water and road facilities to the present troops that you have quartered there at Ford Island. You will complete the work with money on hand some time during the next fiscal year. You are asking next year for facilities for additional forces—

Col. FULLER. In part it is for additional forces. It covers building the essential facilities that are required.

Mr. SLEMP. It may be that you will have \$500,000 to spend in the next fiscal year. I wish you would find out what that is.

Col. FULLER. Gen. Carson can furnish that.

DETAILS OF ESTIMATE.

Mr. SLEMP. Coming to next year's estimates, you estimate \$841,005 for work at Luke Field, \$84,500 at Fort Ruger, and \$37,500 at Fort Kamehameha, making a total of \$936,005. Of the amount originally estimated you have withdrawn \$115,995, leaving a total of \$936,005.

Col. FULLER. Yes, sir; we eliminated the seaplane hangar on account of the Navy establishment at Ford Island.

Mr. SLEMP. You have an item of \$71,000 for completion of roads at Luke Field? That was to be done out of this year's funds, as I understood your statement.

Col. FULLER. We have reduced the roads, walks, facilities, etc., and, as a matter of fact, we have not even the hangars required. This estimate this year covers the essential facilities like hangars, etc.

Mr. SLEMP. Have you a guardhouse there now, or will you have when the present money is expended?

Maj. WALSH. Only of some temporary construction at present.

Mr. SLEMP. Have you a dispensary there?

Maj. WALSH. Utilizing some shed at present.

Mr. SLEMP. And a laundry building?

Maj. WALSH. No, sir.

Mr. SLEMP. Have you educational and vocational training buildings?

Maj. WALSH. No, sir.

Mr. SLEMP. Have you any educational and vocational training forces there?

Gen. MITCHELL. Yes, sir; they are carrying on that work out there, but I do not know what the force is.

Mr. SLEMP. Have you a bakery there now?

Maj. WALSH. No, sir.

Mr. SLEMP. Where do you get bread?

Maj. WALSH. From the posts near there.

Mr. SLEMP. Have you an ice and refrigerating plant?

Maj. WALSH. No, sir.

Mr. SLEMP. How is your ice supplied?

Maj. WALSH. We get it by lighter.

Mr. SLEMP. Is that a satisfactory way?

Maj. WALSH. No, sir; that is the reason for the estimates.

Mr. SLEMP. Why is it not satisfactory?

Maj. WALSH. It is expensive for transportation. This is just the judgment of the local representatives that this will serve the purpose better.

Mr. SLEMP. Have you any garage there?

Maj. WALSH. They are utilizing some kind of building for that purpose.

Mr. SLEMP. Have you a repair shop?

Maj. WALSH. They are using a steel hangar there now.

Mr. SLEMP. Have you any aero repair shop?

Maj. WALSH. They are using a steel hangar now.

Mr. SLEMP. A motor repair shop?

Maj. WALSH. That item is for the completion of the shop that is being partially constructed out of this year's funds.

Mr. SLEMP. You seem to be getting along pretty well when you have to.

Gen. MITCHELL. Of course, when we go to a place we utilize such buildings as we can. We build shacks and sheds, and then gradually improve them.

Mr. SLEMP. You have boat landings there, have you not?

Maj. WALSH. This is for the improvement of them, or to make good the wear and tear.

Mr. SLEMP. And retaining walls?

Maj. WALSH. They are subject to wear and tear.

Mr. SLEMP. You have an estimate for an electric power plant. You have an electric power plant there now, have you not?

Maj. WALSH. No, sir; they are getting current from the mainland.

Mr. SLEMP. Is that satisfactory?

Maj. WALSH. This is a breakdown plant.

Mr. SLEMP. A reserve plant?

Maj. WALSH. Yes, sir.

Mr. SLEMP. The main item there is \$180,000 for 20 married officers' quarters.

Maj. WALSH. No, sir; it is for 24 married officers' quarters and 16 bachelor officers' quarters at Luke Field.

Mr. SLEMP. Are you constructing the present barracks and quarters and the officers' quarters within the limit prescribed in the law?

Maj. WALSH. Yes, sir.

Mr. SLEMP. From this new language here I assume you could not do it. This new language reads: "*Providing*, That not to exceed the following sums may be used in the erection and completion of the structures named," etc.

Col. FULLER. Those expenditures are all itemized there for the reason that they exceed \$20,000. I see no itemized amount for individual construction other than that exceeding \$20,000.

Maj. WALSH. There is no exception asked in the case of quarters in Hawaii.

Mr. SLEMP. These balloon stations, both at Fort Ruger and Fort Kamehameha, are to house the troops used there in connection with the fire control of those batteries?

Col. FULLER. Yes, sir.

Mr. SLEMP. They are now in temporary quarters?

Col. FULLER. I do not know what they are in now, but they are over there, and we made inquiry as to whether there was any accommodations that could be used for this purpose, and the commanding general reported no, and submitted an estimate for the purpose.

Mr. SLEMP. Where are they now?

Col. FULLER. I do not know where they are.

Maj. WALSH. I think they are at Fort Ruger and Fort Kamehameha.

Mr. SLEMP. Can you give us a report on the condition of the structures in which they are living?

Maj. WALSH. After inquiry by cable.

Mr. SLEMP. At Fort Kamehameha, you have an item for a silica generator house and chemical storage and one for cylinder storage building. Is that for the storage of hydrogen gas?

Maj. WALSH. Yes, sir.

Mr. SLEMP. Where do you keep those cylinders now?

Maj. WALSH. They are probably utilizing storage space that is badly needed for current post use.

Col. FULLER. Or they have it in the open.

Mr. SLEMP. Which is it?

Col. FULLER. We have not the information about that.

Mr. SLEMP. Is there anything else you want to say on that?

ITEMS OF FIRST IMPORTANCE.

Col. FULLER. I would like to say that there are certain items here that are considered of very much more importance than others in the program.

Mr. SLEMP. What are they?

Col. FULLER. For the Luke Field administration building, the post exchange, the dispensaries, the two land-plane hangars, the aero-repair shop, and motor-repair shop, the boat landing, the retaining wall, the electric power plant, and the roads and sidewalks.

Mr. SLEMP. The electric power plant is a reserve power plant, it has been testified.

Gen. MITCHELL. Are you sure about that?

Maj. WALSH. I know they are getting electric power from the mainland now.

Col. FULLER. It is \$20,000, and from that we assume that they have estimated for a breakdown plant.

Maj. WALSH. That plant will also be used in connection with fire protection. They would draw from wells on the island in case of fire. In other words, we do not want to have an installation for fire depending entirely upon the mainland power plant.

Gen. MITCHELL. We will need it for night operations anyway. If we should get into a bad fight, we would need it, because you can not work at night without light.

Mr. SLEMP. It seems to me that these things should be put in after you have the main amount of money expended and the buildings up, with the \$1,300,000 disposed of, so that you can see what your hang over is.

Col. FULLER. We have an itemized statement here of what we would do with \$374,000 if that were the only amount allowed for continuation of the work during next year, and I will insert that in the record.

(See revision to give a total Air Service estimate of \$1,580,000 at end of Air Service testimony.)

Mr. SLEMP. That would be a class A item?

Col. FULLER. The War Department classifies this whole amount as class A.

Mr. SLEMP. With regard to Luke Field, was not the Navy supposed to put up an equal amount of money with the Army?

Col. FULLER. Not an equal amount. They stand their expense with their own particular utilities. They have reimbursed the Army \$117,000 for their portion of the land, and, by the way, our appropriation is reduced that amount, which reverted to the Treasury, so that we are losing \$117,000.

Mr. SLEMP. None of these facilities—quarters, barracks, and buildings—are ever used by any naval forces?

Col. FULLER. No, sir; this whole proposition has been carefully coordinated with them.

Mr. SLEMP. Have they any buildings for troops there?

Col. FULLER. Yes, sir.

Mr. SLEMP. Do they keep forces there?

Col. FULLER. They have a small detachment there now. Their present plan contemplates one set of barracks and a seaplane hangar and related buildings.

Mr. ANTHONY. What is the idea of putting the air base at Ford Island?

Maj. WALSH. There are very few suitable places in this vicinity for an air base.

Mr. ANTHONY. Why not go to Schofield Barracks?

Maj. WALSH. We have landing field up there.

Mr. ANTHONY. Why could you not go there, where you would have the utilities that are now existing?

Maj. WALSH. We must work with the Coast Artillery, and we want to go down there, where we can be in touch with them.

Mr. ANTHONY. It seems to me that you are going to a tremendous expense in putting up a little city of your own there. It seems to me that it is an unnecessary expense.

Of course, this started out upon the idea that the Navy would spend a lot of money there, and they had enough land or more than enough for their purposes, and they are using it; but it is turning out as expensive as if we were alone.

AVIATION, SEACOAST DEFENSES, PHILIPPINE ISLANDS.

Mr. SLEMP. You have an estimate of \$1,078,700 for the Philippine Islands. That is an entirely new proposition.

Col. FULLER. The \$1,078,700 estimate covers for Fort Mills quarters for 12 noncommissioned officers; seaplane hangars on the north side, including grading and ramps; subterranean magazine for explosives; a balloon chart room, radio hut, guardhouse, roads, sewers, and electric lights; and gas-storage machines for balloon site No. 2. Nine hundred and fifty thousand dollars is for the establishment at Paranaque, Luzon, and covers quarters and facilities for one air park. Since this estimate was submitted the commanding general cabled that he required \$250,000 for the preparation of a landing field at Corregidor, but that cablegram was received after the estimates had been submitted.

Mr. SLEMP. Have you any field on which to place these buildings if you got the money?

Col. FULLER. Yes, sir.

Mr. SLEMP. Would you use that field or another field?

Col. FULLER. We are now speaking of Fort Mills, on Corregidor Island. Of the money we ask for, \$128,000 is for the completion of that establishment.

Mr. ANTHONY. Can you land airplanes on Corregidor Island now?

Col. FULLER. If \$250,000 were expended there, I am informed that there would be a much better landing field there than the deck of any airplane carrier.

Mr. ANTHONY. You can not land there at all now?

Gen. MITCHELL. You can land in the center of the island. If you had to land there, you could go in there and get out, but it is not an airdrome field. By widening out the tail of the island you could make a landing field.

Mr. ANTHONY. You could land seaplanes there?

Gen. MITCHELL. Yes, sir; you could.

EXISTING EQUIPMENT.

Mr. SLEMP. What is the aviation equipment in the Philippine Islands?

Gen. MITCHELL. There are two observation squadrons.

Mr. SLEMP. Where are they located?

Gen. MITCHELL. One is at Corregidor Island, now using seaplanes, and the other is at the Stotsenburg Field, working with the land troops.

Mr. SLEMP. How are they taken care of?

Gen. MITCHELL. They are in temporary buildings.

Maj. WALSH. We have three barracks constructed or under construction at Corregidor that can take care of two balloon companies and one air squadron.

Mr. SLEMP. If I understand the aviation proposition there, the men and officers now in the Philippines are housed in temporary quarters?

Gen. MITCHELL. The barracks are 90 per cent finished.

Mr. SLEMP. Is this a pursuit proposition that you are contemplating at Paranaque?

Gen. MITCHELL. No, sir; two are observation squadrons, one for duty with the Coast Artillery and one for duty with the mobile troops and the air park at Paranaque.

Maj. WALSH. This will provide for the defense of Manila.

Mr. SLEMP. Is there no field near Manila?

Maj. WALSH. None nearer than 60 miles from Manila.

Mr. ANTHONY. Are there any pursuit planes over there?

Gen. MITCHELL. Some are contemplated.

Mr. SLEMP. Can they be accommodated at the present field over there?

Gen. MITCHELL. Of course, they are working on those fields, but there are no fields right at Manila. The nearest one to Manila is about 60 miles distant.

PARANAQUE.

Mr. SLEMP. This Paranaque, Luzon, is an entirely new proposition?

Gen. MITCHELL. They want to get an airdrome right at Manila.

Mr. SLEMP. Have you the land?

Gen. MITCHELL. No, sir; it has to be bought.

Mr. SLEMP. How much will the land cost?

Maj. WALSH. That is a matter which is rather involved. There is at Camp Claudio a site that the commanding general tried to get by transferring to the Philippine government one of the military reservations that was no longer needed for the Army. That was taken up and worked on for quite a while, but the Governor General finally told the commanding general that it could not be consummated at the present time, because he did not think that he could get the Philippine Legislature to appropriate sufficient money to buy the site from the private owners and then turn it over to the Government for the Cebu Barracks.

That appeared final until we received the alternative plan which we would be forced to take up if we could not get the Camp Claudio site. This plan was the preparation of a site on the McKinley Reservation across the Manila south road from the Camp Claudio site, which involves \$600,000 for the preparation of the site. We got busy in the War Department and cabled to the commanding general that he could add five or six other military reservations to the Cebu Bar-

racks in an effort to get favorable action by the Philippine Government in making this exchange without cost to the Government. We received information from him that it is entirely possible that the proposition will be accepted, but that it will not come for some months. We do not know whether we will get all the land we need; we rather fear that we will not.

Mr. ANTHONY. You are trading with the Philippine Government!

Maj. WALSH. Yes, sir.

Mr. ANTHONY. Do you mean to say that land owned by the Philippine Government is not available to the United States Government for military purposes?

Maj. WALSH. No, sir. They have to acquire this Camp Claudio site from private owners.

Mr. ANTHONY. The land is not owned by the Philippine Government?

Maj. WALSH. No, sir; not yet.

Mr. ANTHONY. What is the purpose of having the Philippine Government acquire it first?

Maj. WALSH. Because it will not cost us anything. We will just give them the six reservations up in the interior and receive the Camp Claudio site in exchange with no transfer of funds.

Mr. SLEMP. You have submitted an estimate of \$600,000 for purchase, clearing, grading, and filling landing field?

Maj. WALSH. We do not feel that the Philippine Government will be able to purchase the entire tract, and we will probably have to purchase a part of the tract.

Mr. SLEMP. You really have not gotten this into definite shape for submission yet.

Maj. WALSH. It is necessarily not in its most complete form.

AIR PARK, FORT M'KINLEY.

Col. FULLER. I should like to call your attention to one thing: that is, we have an item for an air park.

Mr. SLEMP. How much?

Col. FULLER. \$150,000.

Gen. MITCHELL. That is on Government land and we will save money by that.

Mr. SLEMP. Where will that be located?

Col. FULLER. On the Fort McKinley Reservation, just across the road from the Camp Claudio site. The housing facilities already exist there, and we can use the flying field under lease.

Mr. SLEMP. Still you expect to abandon the Fort McKinley proposition if you get this other proposition. Out of what fund have you been using money for aviation in the Philippine Islands; we did not appropriate any last year?

Gen. MITCHELL. From the Army.

Col. FULLER. There was \$600,000 fortifications funds appropriated in 1917.

Mr. SLEMP. Has that all been used?

Col. FULLER. Yes, sir; except \$287.32. If we could get the \$150,000 for the air park, it would include putting up expeditionary hangars, houses, and equipment.

Gen. MITCHELL. That is 7,000 miles away from home.

Col. FULLER. The \$128,000 for Fort Mills will help us to get along.

Mr. SLEMP. You have to spend \$250,000 before you spend that, and you would not spend the \$250,000 until we got the land?

Maj. WALSH. The seaplane activities are there now. What we are asking for is entirely for use in connection with activities going on right now.

Mr. SLEMP. Will the Navy pay half of that?

Maj. WALSH. The Navy is not there. Their naval base is at Cavite, on the mainland.

Col. FULLER. I can give you the details of the \$128,000, if you wish.

Mr. SLEMP. Put them in the record.

Col. FULLER. Yes, sir.

Mr. SLEMP. And suppose you give us the language that you want for the \$150,000, and also the language for the \$128,000.

Col. FULLER. Yes, sir.

(See revision to give a total Air Service estimate of \$2,399,175 at end of Air Service testimony.)

AVIATION, SEACOAST DEFENSES, PANAMA CANAL.

Mr. SLEMP. The next item is the Panama Canal proposition. You had \$239,000 last year, mostly for the extension of France Field. You are asking this year for \$1,293,000. What was done with the France Field in the expenditure of that money?

Col. FULLER. \$230,000 of that was for the France Field and \$9,000 for emergency-landing fields. The commanding general reports that \$217,000 is obligated to the Panama Canal for filling and grading of France Field. The project is 10 per cent completed. \$10,000 is held in the reserve. \$6,000 has been obligated to the district engineer for the preparation of Camp Clayton landing field, which is 50 per cent complete. The balance which is unobligated they expect to obligate in the near future.

Mr. ANTHONY. That is the money appropriated last year?

Col. FULLER. Yes, sir.

Mr. ANTHONY. That was to remove the dangerous conditions that existed on that field?

Col. FULLER. Yes, sir.

Mr. ANTHONY. This \$239,000 will do that?

Maj. WALSH. Yes, sir; we have no information to the contrary.

Mr. ANTHONY. You have a perfectly level field, and all that you have to do now is to prepare the landing place?

Maj. WALSH. Yes, sir. Only one portion had been graded, the \$230,000 will grade the remaining portion of the field and make safe landings possible.

Mr. ANTHONY. It is a level field?

Maj. WALSH. Yes, sir.

Mr. ANTHONY. How large a landing field have you?

Maj. WALSH. I think it must be 100 acres or more.

Mr. SLEMP. I thought the report showed that there was a cliff right close that you had to remove?

Col. FULLER. No, sir; that was at Balboa.

DETAILS OF ESTIMATE.

Mr. SLEMP. You are asking \$1,293,000 this year. What is that for?

Col. FULLER. May I refer to the wording there? There is just one simple change which we would recommend. It is requested that the words "aviation station at France Field, Canal Zone," be stricken out and the words "aviation stations" be substituted. We want, for instance, four balloon hangars. Two hundred thousand dollars is for the purchase only of four demountable balloon hangars. One million and ninety-three thousand dollars for France Field is to provide quarters for 13 married officers, 30 bachelor officers, and four married noncommissioned officers, costing \$368,000. Barracks for three squadrons, \$187,000; certain administrative buildings, \$155,600; garage and storehouse facilities, \$96,000; seaplane hangar, \$180,000; and necessary municipal and electric work, \$106,000.

Mr. ANTHONY. Where is France Field located?

Col. FULLER. On the Atlantic side of the canal.

Mr. ANTHONY. It is your main aviation field for the Canal Zone?

Col. FULLER. It is the only one there. I take it that the committee would understand this situation better if I explained that the entire defense project in Panama was recently studied and sent to the War Department. It was studied by the General Staff and by the Joint Board of the Army and the Navy. That board recommended that certain air service facilities be provided for this year. included in this year's estimate, something over \$2,000,000, but their report came in too late to submit an estimate on that. So, the lesser amount of \$1,293,000 is all that appears in the report. In the study of this matter in the war plans division it is all classified as class A, and in considering reduction the war plans division reported particularly on the necessity for not cutting the Air Service items.

Mr. ANTHONY. Here, again, I notice that the Navy is going to have its own field?

Col. FULLER. The Navy has a submarine base there and have certain air facilities as a part of their submarine base, but we have a photograph here that will show you how much they have there and its relation to their submarine base. This naval report shows that they have two seaplane hangars and one dirigible hangar.

Mr. SLEMP. How many naval aviation troops are there?

Col. FULLER. They have quarters for 14 bachelor officers, 5 married officers, and 360 men.

Mr. SLEMP. Do the naval aviators come under the Air Service of the Army?

Gen. MITCHELL. No, sir. They train their own aviators, they have a training school. We take a few men into our school, but the basic training is exactly the same in both cases.

WORK ACCOMPLISHED.

Mr. SLEMP. How much money have we invested in aviation in Panama?

Maj. WALSH. In Army aviation, \$1,036,650, very approximately.

Mr. SLEMP. What have we to show for that?

Maj. WALSH. We have quarters for 17 married officers, 24 married noncommissioned officers, barracks for one squadron, and some

temporary buildings, but no administration building or storehouses; we have a flying field and certain emergency landing fields along the canal and a portion of the municipal work.

AIR SERVICE TROOPS AT PANAMA.

Mr. ANTHONY. Have you one or two squadrons there now?

Maj. WALSH. Only one, with a group headquarters and photo section.

Mr. ANTHONY. How many troops do you figure two squadrons would supply, a division?

Gen. MITCHELL. One squadron can handle a division. This is an Artillery proposition, embracing the coast batteries as well as the divisional Field Artillery. The approved proposition was to put an airdrome at each end of the canal.

Mr. ANTHONY. The Army's plan, as I understand, if they were allowed an army of 280,000, was to have a division of troops in Panama?

Gen. MITCHELL. Yes, sir.

Mr. ANTHONY. Of course, that embraces a very large area contingent on whatever you are asking?

Gen. MITCHELL. Only the one squadron. If you have Infantry, Cavalry, and Field Artillery and had to carry out the necessary observation functions with these organizations, as well as with the Coast Artillery, a minimum of two observation squadrons is necessary.

Mr. SLEMP. You have already barracks for 17 married officers and 12 noncommissioned officers and 1 squadron. If we reduce the Army to 150,000, which we will, probably, they will not have to have a division of troops in Panama, and instead of having 19,000 they will have probably 3,000.

Gen. MITCHELL. If you make it for infantry and artillery, you could not cut it down very much. It is already at reduced strength; if you work the Coast Artillery and Infantry, you certainly will have to have two squadrons.

Mr. ANTHONY. What class of planes do you keep there?

Gen. MITCHELL. Observation planes.

Mr. ANTHONY. What will be the cost of housing your officers and men under the reduced strength, one more squadron?

DETAILS OF ESTIMATES.

Maj. WALSH. I have figures here which total for the Panama Canal Zone \$580,000, which provides for one additional barracks there and certain other construction, which is very essential. I should like to give you the facts.

Mr. SLEMP. We should like to have you give us the costs.

(See revision to give a total Air Service estimate of \$1,580,000, appearing at end of Air Service testimony.)

Mr. SLEMP. Have you an administration building there?

Maj. WALSH. No; it is very essential.

Mr. SLEMP. How much will it cost?

Maj. WALSH. The complete building \$72,000. We could construct part of it, say, for \$37,000, but such a cut would be purely arbitrary, so we recommended the construction of the whole building.

Mr. SLEMP. Do you mean that the administration building, only a part of the building, is to cost \$37,500?

Maj. WALSH. Yes, sir. We have also included in the \$580,000, \$100,000 for two demountable balloon hangars.

Mr. ANTHONY. What will be the type of construction?

Maj. WALSH. It will have to be concrete.

Mr. ANTHONY. Solid concrete?

Maj. WALSH. I suppose tile and stucco on the outside with concrete foundations. Wood construction is very unsatisfactory in the Panama Canal Zone on account of the ants.

Mr. SLEMP. Where will the balloon hangars be located?

Maj. WALSH. We should like to get four. In that case we would locate one at Fort Sherman, one at Fort Randolph, on the Atlantic side.

Col. FULLER. And on the Pacific side near Balboa.

Mr. SLEMP. And they will cost \$200,000?

Col. FULLER. They will be demountable hangars, which can be taken down and set up.

Mr. SLEMP. You have storage facilities for hydrogen and quarters for the men, or will the men be quartered in the coast defenses with the Coast Artillery?

Col. FULLER. We think there will be sufficient quarters for them.

Mr. SLEMP. Will you house the new proposed squadron with them?

Col. FULLER. No, sir. The squadron would have to go to France Field, go right in with the Coast Artillery.

Mr. SLEMP. Have you any other squadron at France Field besides the aviation?

Maj. WALSH. No, sir.

Mr. ANTHONY. Will you keep any planes on the Pacific coast?

Gen. MITCHELL. No, sir; we have no airdrome.

Mr. ANTHONY. Will you not need to fly them over?

Gen. MITCHELL. Yes, sir.

Mr. ANTHONY. It is perfectly feasible?

Gen. MITCHELL. It is a very long way.

Maj. WALSH. And on account of the restricted landing field available, everybody turns out to see them land; it is quite a dangerous proposition.

Col. FULLER. As stated before the committee last year, it was a very dangerous thing and several men had been killed. Since that time the defense board for Panama has studied the matter continuously for almost a year and has submitted its report, and its report is that there is no satisfactory place for a landing field and recommends that the main aviation station for Panama be established at the Balboa field, for which in the estimate prepared by the defense board of Panama approximately \$1,000,000 is required for filling and grading.

Mr. SLEMP. That is about \$400,000 more than you stated last year?

Col. FULLER. I think we gave only a portion of the estimate at that time, which was for the grading, which is approximately \$800,000. The estimate for the further preparation of the field is about \$200,000.

As to the partial construction, I should like to explain that it would be nothing more or less than an arbitrary cut. For instance, the administration building, the estimated cost coming from the canal is so much, and it would be just an arbitrary cut, if we could not afford to pay that much money and we should estimate for a part of it. We would not know how much would be built, nor even whether it was actually possible to construct the building in sections.

Mr. SLEMP. In other words, of the amount asked for next year, you propose to spend so much and ask the committee for the remaining part the next fiscal year?

Col. FULLER. Yes, sir.

Mr. ANTHONY. Is it not pretty expensive to maintain the buildings at the Balboa Field?

Col. FULLER. It is expensive. They studied the matter continuously, as I say, for a long time, and there is no other place.

Mr. ANTHONY. Is there not land a few miles to the south toward Old Panama, the Savanna territory?

Col. FULLER. No, sir. That was thoroughly gone into.

Gen. MITCHELL. We went into that in great detail, Mr. Anthony.

Col. FULLER. Mr. Chairman, in connection with the figures given as to the reduced cost, may we also put into the hearing another estimated reduction, which is a more rational one?

Mr. SLEMP. Please also put into the hearing an estimate of the complete facilities for the squadron there—say, you have a unit well equipped at France Field; that is what you have there now, and if you are going to build it up, build it up by units, something of that kind.

Col. FULLER. And may we also put in the amount required for the overhaul of the equipment?

Mr. SLEMP. Yes, sir. You have light, ice, laundry, and other facilities at France Field?

Maj. WALSH. Speaking generally; yes, sir.

Col. FULLER. It will necessitate certain modifications in the wording?

Mr. SLEMP. You may submit that.

AIR SERVICE ESTIMATE AS ORIGINALLY SUBMITTED TO COMMITTEE, AMOUNTING TO \$3,931,430.

Recapitulation.

Continental United States	\$596,725
Hawaiian Islands	963,005
Philippine Islands	1,078,700
Panama Canal	1,293,000
Total	3,931,430

CONTINENTAL UNITED STATES.

SEACOAST DEFENSE AVIATION STATIONS.

Purchase of sites for aerial coast defense stations, as follows:

Long Island Sound	\$27,500
Narragansett Bay (3 parcels)	69,000
Boston Harbor	351,475
Portland Harbor	88,750
Puget Sound	60,000
Total	596,725

It is requested that the period after the last word now appearing on page 17 of the subcommittee print be changed to a colon and the following proviso added:

"*Provided*, That the following unexpended amount of appropriation contained in fortifications appropriation act approved February 14, 1917, under item 'Aviation seacoast defense,' shall remain on the books of the Treasury to the credit of that appropriation until June 30, 1922, to permit completion of contracts made with manufacturers of airplanes prior to June 30, 1920. \$688,277.60."

INSULAR POSSESSIONS.

AVIATION SEACOAST DEFENSES, HAWAIIAN ISLANDS.

1. The total estimated for under this item should be reduced from \$1,079,000, as carried in the subcommittee print, to \$963,005, a reduction of \$115,995.

2. The details of the subprojects to which this reduced amount applies is as follows:

Luke Field.

4 field officers' quarters.....	\$40, 000	
20 married officers' quarters.....	180, 000	
2 bachelor officers' quarters.....	24, 000	
Total officers' quarters.....		\$244, 000
6 noncommissioned officers' quarters.....	30, 000	
4 bachelor noncommissioned officers' quarters.....	24, 000	
Total noncommissioned officers' quarters.....		54, 000
1 barracks (200 men).....		50, 000
1 administration building.....	16, 000	
1 post exchange and administration building.....	50, 000	
1 guardhouse.....	16, 000	
1 dispensary.....	16, 000	
1 educational and vocational training building.....	35, 000	
1 laundry building.....	4, 000	
1 bakery.....	8, 000	
1 ice and refrigerator plant.....	45, 000	
1 garage and repair shop.....	35, 000	
2 hangars, land plant.....	22, 000	
1 aero repair.....	37, 000	
1 motor repair (completion of).....	20, 000	
1 miscellaneous shop.....	8, 000	
1 dope and paint shop.....	7, 000	
2 boat landings.....	28, 000	
Total technical buildings.....		347, 000
Retaining walls, completion of.....	15, 000	
1 electric power plant.....	35, 000	
Roads, completion of.....	71, 000	
Sidewalks, completion of.....	15, 005	
Contingencies, completion of.....	10, 000	
Total utilities.....		146, 005
Total Luke Field.....		841, 005

Fort Ruger.

1 bachelor officers' quarters.....	\$18, 000	
1 bachelor noncommissioned officers' quarters.....	10, 000	
1 garage.....	\$8, 000	
1 silicol generator and chemical storage house.....	17, 500	
1 cylinder-storage building.....	20, 000	
Total technical buildings.....		45, 500
Walks, completion of.....	1, 000	
Contingencies, completion of.....	10, 000	
Total utilities.....		11, 000
Total Fort Ruger.....		84, 500

Fort Kamehameha.

1 silicol generator house and chemical storage-----	\$17, 500	
1 cylinder-storage building-----	20, 000	
		<hr/>
Total technical buildings-----		\$37, 500
		<hr/>
Total Fort Kamehameha-----		37, 500

Recapitulation.

Luke field-----	\$841, 005
Fort Ruger-----	84, 500
Fort Kamehameha-----	37, 500
	<hr/>
Grand total-----	963, 005

AVIATION SEACOAST DEFENSE, PHILIPPINE ISLANDS.

1. No changes desired or necessary in the total of estimate \$1,078,700, but the words "\$600,000 for clearing, grading, and filling landing field" appearing in the thirteenth and fourteenth lines of subcommittee print should be amended to read "\$600,000 for the purchase, clearing, grading, and filling landing field."

2. The details in connection with the subproject pertain to the total carried in the estimate are as follows:

Paranaque, Luzon.

1 field officers' quarters-----	\$6, 000	
4 married officers' quarters-----	22, 000	
1 bachelor officers' quarters-----	6, 000	
		<hr/>
Total officers' quarters-----		\$34, 000
4 noncommissioned officers' quarters-----		12, 000
1 barracks for 200 men-----		40, 000
2 large hangars-----	\$30, 000	
6 small hangars-----	60, 000	
1 photo hut-----	4, 000	
1 blacksmith shop-----	2, 400	
1 motor tests-----	4, 000	
1 administrative building-----	6, 000	
1 guard house-----	7, 000	
1 post exchange and amusement hall-----	12, 000	
		<hr/>
Total technical buildings-----		125, 400
Purchase, clearing, grading, and filling landing field-----	\$600, 000	
Roads and walks-----	30, 000	
Water system-----	25, 000	
Electric lights-----	10, 000	
Sewers-----	15, 000	
Contingencies-----	58, 600	
		<hr/>
Total utilities-----		738, 600
Total Paranaque, Luzon-----		950, 000

Fort Mills, Luzon.

12 noncommissioned officers' quarters-----	\$36, 000
1 guardhouse-----	\$6, 000
1 silicol generator and chemical storage building (balloon site No. 2)-----	3, 000
1 subterranean magazine for explosives-----	40, 000
1 seaplane hangar, north side, including grading and ramps-----	30, 000

1 balloon chart room.....	\$2,500
1 radio hut.....	1,200
	<hr/>
Total technical buildings.....	\$82,700
Roads, sewers, and electric lights.....	10,000
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Total Fort Mills, Luzon.....	128,700

Recapitulation.

Paranaque, Luzon.....	\$950,000
Fort Mills, Luzon.....	128,700
	<hr/>
Grand total.....	1,078,700

PANAMA CANAL ZONE.

AVIATION SEACOAST DEFENSE.

1. The amount carried in the estimate corresponds to the amount approved by the War Department for inclusion therein. It is desired, however, to request that the words "the aviation station at France Field, Canal Zone," appearing in lines 12 and 13 of the subcommittee print, be changed to read "aviation stations."

2. It is also desired that the following clause be added after the last sentence of this item:

"Provided, That not to exceed the following sums may be used for the purpose indicated: \$28,000 for one commanding officers' quarters, \$26,000 for each double captains' quarters, \$33,000 for each four-set lieutenants' quarters, \$40,000 for each six-set bachelor officers' quarters, \$22,000 for each four-set noncommissioned officers' quarters; \$187,000 for each barracks, \$72,000 for one administration building, \$37,000 for one quartermaster storehouse, \$30,000 for one technical storehouse, \$29,000 for one garage, \$180,000 for one seaplane hangar, \$66,400 for municipal work, \$40,000 for electrical work \$50,000 for grading and seeding around buildings, all at France Field, Canal Zone; and \$50,000 for each demountable balloon hangar."

3. The details of the subproject pertain to the total of \$1,293,000 carried in the estimate, are as follows:

France Field.

1 commanding officers' quarters.....	\$28,000
2 double captains' quarters.....	52,000
2 four-set lieutenants' quarters.....	66,000
5 six-set bachelor officers' quarters.....	200,000
	<hr/>
Total officers' quarters.....	\$346,000
1 four-set noncommissioned officers' quarters.....	22,000
1 barracks, 500 men.....	187,000
1 administration building.....	72,000
1 dope and fabric shop.....	6,000
1 radio repair shop.....	6,000
1 armory.....	6,000
1 fire station.....	3,600
1 quartermaster storehouse.....	37,000
1 technical storehouse.....	30,000
1 garage.....	29,000
1 addition to boathouse, 2 stalls.....	6,000
1 seaplane hangar.....	180,000
Grading and seeding around buildings.....	50,000
Machine-gun butts.....	6,000
	<hr/>
Total technical buildings.....	431,600
Municipal work.....	66,400
Electrical work.....	40,000
	<hr/>
Total utilities.....	106,400
	<hr/>
Total France Field.....	1,093,000

Balloon base lines.

4 demountable balloon hangars----- \$200,000

Recapitulation.

France Field ----- 1,093,000
Balloon base lines----- 200,000

Grand total ----- 1,293,000

REVISION TO GIVE A TOTAL AIR SERVICE ESTIMATE OF \$2,399,175. •

Recapitulation.

Continental United States----- \$420,475
Hawaiian Islands ----- 684,000
Philippine Islands ----- 278,700
Panama Canal ----- 1,016,000

Total----- 2,399,175

CONTINENTAL UNITED STATES.

Seacoast defense aviation stations.

Purchase of sites for aerial coast defense stations, as follows:

Boston Harbor ----- \$351,475
Naragansett Bay (3 parcels)----- 69,000

Total----- 420,475

INSULAR POSSESSIONS—AVIATION SEACOAST DEFENSES. HAWAIIAN ISLANDS.

Luke Field.

2 field officers' quarters----- \$20,000
10 married officers' quarters----- 90,000
2 bachelor officers' quarters (16 officers)----- 24,000

Total officers' quarters----- \$134,000

6 noncommissioned officers' quarters----- 30,000
4 bachelor noncommissioned officers' quarters----- 24,000

Total noncommissioned officers' quarters----- 54,000

1 barracks (200 men)----- 50,000
1 administration building----- 16,000
1 post exchange and administration building----- 25,000
1 guardhouse----- 16,000
1 dispensary ----- 16,000
1 laundry building----- 4,000
1 bakery ----- 8,000
1 ice and refrigerating plant----- 45,000
2 hangars, land plane----- 22,000
1 aero repair ----- 37,000
1 motor repair (completion of)----- 20,000
1 miscellaneous shop----- 8,000
1 dope and paint shop----- 7,000
2 boat landings ----- 28,000

Total technical buildings ----- 252,000

Retaining walls (completion of)----- 15,000
1 electric power plant----- 35,000
Roads (completion of)----- 20,000
Sidewalks (completion of)----- 10,000
Contingencies ----- 10,000

Total utilities ----- 90,000

Total Luke Field----- 580,000

Fort Ruger.

1 bachelor noncommissioned officers' quarters-----		\$10,000
1 garage-----	\$8,000	
1 silicol generator and chemical storage house-----	17,500	
1 cylinder storage building-----	20,000	
Total technical buildings-----		45,500
Walks, completion of-----	1,000	
Contingencies, completion of-----	10,000	
Total utilities-----		11,000
Total, Fort Ruger-----		66,500

Fort Kamehameha.

1 silicol generator house and chemical storage-----	\$17,500	
1 cylinder storage building-----	20,000	
Total technical buildings, Fort Kamehameha-----		<u>\$37,500</u>

Recapitulation.

Luke Field-----	\$580,000
Fort Ruger-----	66,500
Fort Kamehameha-----	37,500
Grand total-----	<u>684,000</u>

INSULAR POSSESSIONS—AVIATION SEACOAST DEFENSE, PHILIPPINE ISLANDS.

Paranaque, Luzon.

2 large hangars-----	\$30,000	
6 small hangars-----	60,000	
1 photo hut-----	4,000	
1 blacksmith shop-----	2,400	
1 motor tests-----	4,000	
1 administrative building-----	6,000	
1 guardhouse-----	7,000	
1 post exchange and amusement hall-----	12,000	
Total technical buildings-----		\$125,400
Contingencies-----	\$24,600	
Total utilities-----		24,600
Total, Paranaque, Luzon-----		<u>150,000</u>

Fort Mills, Luzon.

12 noncommissioned officers' quarters-----		36,000
1 guardhouse-----	\$6,000	
1 Silicol generator and chemical storage building (balloon site No. 2)-----	3,000	
1 subterranean magazine for explosives-----	40,000	
1 seaplane hangars, north side, including grading and ramps-----	30,000	
1 balloon chart room-----	2,500	
1 radio hut-----	1,200	
Total, technical buildings-----		82,700
Roads, sewers, and electric lights-----	\$10,000	
Total utilities-----		10,000
Total, Fort Mills, Luzon-----		<u>128,700</u>

Recapitulation.

Paranaque, Luzon.....	\$150, 000
Fort Mills, Luzon.....	128, 700
Grand total.....	278, 700

PANAMA CANAL ZONE—AVIATION SEACOAST DEFENSE.

France Field.

2 double captains' quarters.....	\$52, 000
1 four-set lieutenants' quarters.....	33, 000
3 six-set bachelor officers' quarters.....	120, 000
Total officers' quarters.....	\$205, 000
1 four-set noncommissioned officers' quarters.....	22, 000
2 barracks.....	127, 000
1 administration building.....	72, 000
1 dope and fabric shop.....	6, 000
1 radio repair shop.....	6, 000
1 armory.....	6, 000
1 fire station.....	3, 600
1 quartermaster storehouse.....	37, 000
1 technical storehouse.....	30, 000
1 addition to board house, 2 stalls.....	6, 000
1 seaplane hangar.....	180, 000
Grading and seedling around buildings.....	45, 000
Machine-gun butts.....	6, 000
Total technical buildings.....	397, 600
Municipal work.....	41, 400
Electrical work.....	23, 000
Total utilities.....	64, 400
Total, France Field.....	816, 000

Balloon base lines.

4 demountable balloon hangars.....	200, 000
Total balloon base lines.....	200, 000

Recapitulation.

France Field.....	816, 000
Balloon base lines.....	200, 000
Grand total.....	1, 016, 000

REVISION TO GIVE A TOTAL AIR SERVICE ESTIMATE OF \$1,580,000.

Recapitulation.

Continental United States.....	\$420, 475
Hawaiian Islands.....	374, 000
Philippine Islands.....	205, 000
Panama Canal.....	580, 600
Total revised estimate.....	1, 580, 000

Continental United States.

Purchase of sites for aerial coast-defense stations, as follows:

Boston Harbor.....	\$351, 475
Naragansett Bay (three parcels).....	69, 000
	420, 475

REVISION TO GIVE A TOTAL AIR SERVICE ESTIMATE OF \$1,580,000.

INSULAR POSSESSIONS—AVIATION SEACOAST DEFENSES, HAWAIIAN ISLANDS.

Luke Field,

1 field officers' quarters.....	\$10,000	
5 married officers' quarters.....	45,000	
1 bachelor officers' quarters (8).....	12,000	
		<hr/>
Total officers' quarters.....		\$67,000
3 married noncommissioned officers' quarters.....	15,000	
2 bachelor noncommissioned officers' quarters.....	12,000	
		<hr/>
Total noncommissioned officers' quarters.....		27,000
1 administration building.....	18,000	
1 post exchange and administration building.....	25,000	
1 dispensary.....	16,000	
2 hangars—land plane.....	22,000	
1 aero repair.....	37,000	
1 motor repair (completion of).....	20,000	
1 boat landing.....	14,000	
		<hr/>
Total technical buildings.....		150,000
Retaining walls (completion of).....	15,000	
Electric power plant.....	20,000	
Roads.....	20,000	
Sidewalks.....	5,000	
Contingencies.....	15,000	
		<hr/>
Total utilities.....		75,000
		<hr/>
Total for Luke Field.....		319,000

Fort Ruger.

1 garage.....	\$3,000	
1 silicol generator and chemical storage house.....	11,000	
1 cylinder storage building.....	11,000	
		<hr/>
Total technical buildings.....		\$25,000
Contingencies.....	5,000	
		<hr/>
Total utilities.....		5,000
		<hr/>
Total Fort Ruger.....		30,000

Fort Kamehameha.

1 silicol generator and chemical storage house.....	\$11,000	
1 cylinder storage.....	11,000	
		<hr/>
Total technical buildings.....		\$22,000
Contingencies.....	3,000	
		<hr/>
Total utilities.....		3,000
		<hr/>
Total Fort Kamehameha.....		25,000

Recapitulation.

Luke Field.....	\$319,000	
Fort Ruger.....	30,000	
Fort Kamehameha.....	25,000	
		<hr/>
Grand total--Hawaii.....		\$374,000

INSULAR POSSESSIONS—AVIATION SEACOAST DEFENSE, PHILIPPINE ISLANDS.

Paranaque, Luzon.

2 large hangars	\$30,000	
6 small hangars	60,000	
1 motor test	4,000	
Total technical buildings		\$94,000
Contingencies	31,000	
Total utilities		31,000
Total Paranaque, Luzon		125,000

Fort Mills.

6 noncommissioned officers' quarters		\$18,000
1 lilicol generator and chemical storage building (balloon site No. 2)	\$3,000	
1 subterranean magazine for explosives	20,000	
1 seaplane hangar, north side, including grading and ramps	30,000	
Total technical buildings		53,000
Roads, sewers, and electric light	9,000	
Total utilities		9,000
Total Fort Mills		80,000

Recapitulation.

Paranaque, Luzon	\$125,000
Fort Mills, Luzon	80,000
Grand total, Philippine Islands	205,000

PANAMA CANAL ZONE—AVIATION SEACOAST DEFENSE.

France Field.

2 double captains' quarters	\$52,000	
2 6-set bachelor officers' quarters	80,000	
Total, officers' quarters		\$132,000
1 4-set noncommissioned officers' quarters		22,000
1 barracks		70,000
1 administrative building	72,000	
1 quartermaster storehouse	37,000	
1 technical storehouse	30,000	
1 addition to boathouse	6,000	
Grading and seeding	35,000	
1 dope and fabric shop	6,000	
1 radio repair shop	6,000	
1 armory	6,000	
1 fire station	3,600	
Total, technical buildings		201,600
Municipal work	35,000	
Electrical work	20,000	
Total utilities		55,000
Total, France Field		480,600

Balloon base lines.

2 demountable balloon hangars..... \$100,000

Recapitulation.

France Field	480,000
Balloon base lines.....	100,000
	<hr/>
Grand total, Panama Canal Zone.....	580,000

Gen. MITCHELL. We thank the committee for their courtesy.

THURSDAY, FEBRUARY 10, 1921.

**STATEMENTS OF BRIG. GEN. H. M. LORD, CHIEF OF FINANCE;
COL. JOHN A. HULL, CHAIRMAN, WAR DEPARTMENT CLAIMS
BOARD; AND MR. GEORGE R. TAYLOR.**

UNEXPENDED BALANCES.

Mr. SLEMP. Gen. Lord, it is always a pleasure to have you before the committee, and I know you bring us some good news. Various appropriations have been hanging over in the War Department from war and other appropriations, beginning, you might say, in 1917 and running up to the present, and certainly last year. The committee last year tried, with your very courteous assistance, to dig this out and return to the Treasury as much as possible, and you gave us then \$800,615,139.13. We have asked you to make a further study of this proposition so that the matter could be completed and all of these war appropriations discontinued, so that expenditures under the Fortifications Committee, and other similar items, should come from direct appropriations each year from the respective committees. What have you to report this year on that?

Gen. LORD. Under date of February 5, in compliance with the request of the chairman of this subcommittee, I submitted a memorandum to the chairman of the Committee on Appropriations, having the approval of the Secretary of War. This recommendation provided for a change from an appropriated to an unappropriated status of 1919 appropriations, principally to the amount of \$225,000,000. This \$225,000,000 is made up of Ordnance appropriations for 1919 and 1919-20; Engineer appropriations of 1919; a balance under inland and port storage and shipping facilities, 1918-19, and a small balance from that same appropriation in a no-year appropriation. Before making this recommendation the approval of the Chief of Engineers and the Chief of Ordnance, whose appropriations were involved, was secured. This action has since been confirmed by the Secretary of War, and he has sent, through proper channels, a recommendation in accordance with the letter I have here, and a copy of that letter was sent to the chairman of the Senate Committee on Appropriations. With your approval I will include the recommendation in the record.

(Said letter follows:)

FEBRUARY 5, 1921.

THE CHAIRMAN COMMITTEE ON APPROPRIATIONS,
House of Representatives.

SIR: 1. Having reference to the request of the Hon. C. Bascom Slemph, chairman subcommittee on fortifications bill, that he be advised of the unobligated balances of appropriations heretofore made to the War Department, which could be repealed and covered into the Treasury, I have to report that the following appropriation balances, over and above all outstanding liabilities, are available to be restored to the Treasury and placed in an unappropriated status:

Automatic rifles, 1919-----	\$23, 000, 000
Armored motor cars, 1919 and 1920-----	17, 500, 000
Ammunition for antiaircraft guns. Army, 1917-1919-----	200, 000
Arms, uniforms, equipment, etc., Field Service, National Guard 1919-----	1, 000, 000
Ordnance stores and equipment, civilian military training camps, 1919-----	250, 000
Ordnance stores, equipment, etc., Reserve Officers' Training Corps 1919-----	500, 000
Ordnance stores—ammunition, 1917-1919, act-----	9, 000, 000
Ordnance stores—ammunition, 1919 and 1920-----	35, 500, 000
Ordnance stores and supplies, 1918 and 1919-----	8, 000, 000
Ordnance stores and supplies, 1919 and 1920-----	39, 000, 000
Manufacture of arms, 1917-1919, act-----	400, 000
Manufacture of arms, 1918 and 1919-----	300, 000
Manufacture of arms, 1919 and 1920-----	18, 000, 000
Small arms target practice, 1917-1919, act-----	1, 000, 000
Small arms target practice, 1918 and 1919-----	10, 000, 000
Small arms target practice, 1919 and 1920-----	3, 000, 000
Engineer operations in the field, 1919-----	51, 000, 000
Engineer equipment of troops, 1919-----	2, 000, 000
Inland and port storage and shipping facilities, 1918 and 1919-----	4, 000, 000
Inland and port storage and shipping facilities, no year-----	1, 350, 000
Total-----	225, 000, 000

2. With the exception of the following, all of these balances would, by operation of law, be carried to the surplus fund of the Treasury on June 30 next:

Armored motor cars, 1919-20-----	\$17, 500, 000
Ordnance stores, ammunition, 1919 and 1920-----	35, 500, 000
Ordnance stores and supplies, 1919 and 1920-----	39, 000, 000
Manufacture of arms, 1919 and 1920-----	18, 000, 000
Small-arms target practice, 1919 and 1920-----	3, 000, 000
Inland and port storage and shipping facilities, no year-----	1, 350, 000

3. It is believed that the amount reported under "Inland and port storage and shipping facilities" (\$1,350,000) may be increased at a later date, when all pending claims have been disposed of.

4. The Secretary of War has given his approval to this contemplated action; also the Chief of Engineers and Chief of Ordnance have reported that the balances here stated may be revoked.

Respectfully,

H. M. LORD,
Chief of Finance, United States Army.

Mr. SLEMP. Does this also have the approval of the Claims Board?

FINAL WAR SETTLEMENTS.

Gen. LORD. Before making this recommendation a very careful study was made as to the condition of outstanding claims under the appropriations involved which would be reduced by this action, and an ample amount was reserved to meet the outstanding claims that

were before the War Department Claims Board, which were estimated by the acting chief of that board, Col. Hull, at \$73,551,246.62. Reservations were also made for French Government claims, \$35,000,000; British Government claims, \$25,000,000; United States Navy settlement, \$1,200,000; and Shipping Board claims, \$60,000,000; making a total of \$194,751,246.62.

Mr. ANTHONY. That are not adjudicated?

Gen. LORD. Not adjudicated. The amount reserved is ample, and I think we will not require all the amount reserved to meet outstanding claims, but the only safe action was to cover everything at the outside.

Mr. ANTHONY. How much money are you holding to meet those claims?

Gen. LORD. \$194,751,246.62.

Mr. ANTHONY. To meet a gross of how many claims?

Gen. LORD. That is the gross of the claims. Under this appropriation we have an estimated balance of a little more than \$24,000,000 as a matter of safety after setting aside the reservations stated, but this is the best estimate we can give as to the outstanding claims.

Mr. SLEMP. I do not quite understand that. The \$73,000,000 which you mention is an estimate of what the Government will perhaps have to pay out and not the face value of the claims.

Gen. LORD. No; that is the outside estimate from the War Department Claims Board, which can best be explained by Col. Hull. It makes a total, as I said, for all claims of \$194,751,246.62. We have kept under this one appropriation, which I am discussing, something more than \$24,000,000 to meet all other demands that may arise.

Mr. SLEMP. Let us see whether this is a proper statement: Of the billions of dollars expended and of the thousands of contracts entered into by the Ordnance Department, the Engineer Department, the Aviation Department, and so on—even in matters not pertaining to the Fortifications Committee—everything has now been reduced to a total possible liability of \$194,000,000.

Gen. LORD. Yes, sir.

Mr. SLEMP. Of that \$194,000,000 there is reserved in cash \$73,000,000 for outstanding claims that may come before the Claims Board for adjudication.

Gen. LORD. Yes, sir.

Mr. SLEMP. What is the face value of those outstanding claims?

Col. HULL. At that time the face value was about a half billion dollars.

Mr. SLEMP. Then you have retained about 14½ per cent. and that is a little more than the average basis of settlement of claims heretofore?

Col. HULL. Possibly.

Mr. SLEMP. And that is due to the fact that the claims are now more difficult of adjustment, and therefore it is necessary to reserve a greater percentage?

Col. HULL. Yes. I might state how this estimate of \$73,000,000 was made: Where our study of cases had gone far enough to permit us to make an estimate of the figures we did so. Where the cases had not gone far enough so that we had accurate knowledge of what we would likely be called upon to spend, we had to make figures

based on past experience. The figure of 14½ per cent of former settlements, of course, involved a great many settlements made early in the history of the War Department Claims Board, where we had acquittances of enormous sums of contractual liability for virtually nothing, because the contractors had not gone to any expense. We wrote those off very cheaply. I think there was one contract in the Engineer Department where we had an outstanding contractual liability of about \$3,000,000 that we settled for \$1.

Mr. SLEMP. As a general proposition the Government settles where goods were delivered and in good shape, and most of this money was paid in settlement of informal contracts where some Government agent had said, "You go ahead on this proposition," and he had gone ahead and incurred some expense, but did not deliver the goods. In such a case you made the best adjustment you could?

Col. HULL. Of course, there were a number of cases like that, but we also have outstanding formal contracts and we also have outstanding a number of contracts that were apparently formal, but were so-called proxy signed which, under the decision of the comptroller, became informal. We have outstanding the claims of some of the largest contractors, who delivered a great quantity of goods; the goods delivered have been paid for, but in the cancellation of their outstanding obligations they have an immense amount of raw material, both singly purchased and also in process, and they have facilities against which they charge a reasonable amortization, based on the canceled portion of the contracts.

You might be interested in knowing that on the docket of January 8 we had 490 cases, of which 161 were appraisals, leaving a total of 329; the report of February 5 shows a total number of cases on the docket of 427, of which 185 pertain to the appraisal section, leaving on the docket 242 cases, or a reduction during the month of 87 cases.

Mr. SLEMP. Under the law all of these cases must be settled before the 1st of July?

Col. HULL. Yes; on account of the money lapsing into the Treasury.

Mr. SLEMP. Does this also involve the obligation to the tractor company?

Col. HULL. Yes; the Holt cases have not been disposed of.

Mr. SLEMP. What do they ask of the Government?

Col. HULL. I have not the figures in my mind.

Mr. SLEMP. Is the expectation that you may owe the British Government \$25,000,000 based upon a specific contract with that Government?

Col. HULL. It is based mainly on the negotiations with the British Government growing out of the so-called Reading-Hines agreement. They transported our troops and freight at a certain rate, and that is now in process of being ironed out between Brig. Gen. William D. Connor, representing the Secretary of War, and Sir Ernest Rayburn, representing the British minister of shipping. Those negotiations are going on right now, and will probably be consummated this month.

Mr. SLEMP. Do our representatives apply an offset in any way, and will England be given credit for that, or will we have to pay that money?

Col. HULL. We have joint claims, one against the other, and the total may exceed \$25,000,000. In answer to your question as to whether that will be paid in money, it will be certified to the Treasury Department. Under the Reading-Hines agreement, and following that the Parker agreement, if the joint balance is due from the United States we will have to pay at the rate of 5 per cent per annum for whatever sum is mutually agreed upon until payment is made by the Treasury Department. Therefore it should be promptly paid; otherwise the appropriations of the Army will have to carry this additional 5 per cent per annum.

Mr. SLEMP. We would not have to pay the \$25,000,000 in cash, but pay 5 per cent each year plus interest.

Col. HULL. Our agreement is to pay cash, and if we do not pay cash to pay 5 per cent per annum in addition.

Mr. SLEMP. That is, just pay interest on it?

Col. HULL. Yes; on anything which we do not pay.

Mr. SLEMP. Then we have accounts against them on which they pay us 5 per cent interest, so why not wipe it off?

Col. HULL. That is a question for the Treasury Department.

Mr. SLEMP. The agreement would justify that, would it not?

Col. HULL. My understanding—and this is practically unofficial because it has never been before me—was that the agreement was to pay the net balance in cash, so as not to increase our loans to Great Britain.

Mr. SLEMP. Why would it not be alright if we just credited what Great Britain owes us with \$25,000,000?

Col. HULL. That is a matter between the State and Treasury Departments.

Mr. SLEMP. Does the same situation exist as to France?

Gen. LORD. Yes.

Mr. SLEMP. Have we any money on deposit in Great Britain to meet this?

Col. HULL. My recollection is that our large sterling account in London has been liquidated.

Gen. LORD. It has been liquidated. We have 582,532,763 francs and 90 centimes on deposit in France to meet our engagements over there.

Mr. SLEMP. Are these payments to be made in dollars, in sterling, in marks, or how?

Col. HULL. The British transportation agreement, the agreement between Gen. Hines and Lord Reading, established a rate of \$4.76 per pound.

Mr. SLEMP. We can buy pounds for very much less than that. The other items you mentioned—\$1,200,000 under the United States Navy settlement and \$60,000,000 of Shipping Board claims, I imagine, are subject to future adjustments between the various departments.

SHIPPING BOARD CLAIMS.

Gen. LORD. A claim has been submitted by the Shipping Board approximating \$97,000,000 for charter hire for seized enemy vessels, for losses of Shipping Board ships, for losses of German vessels which this Government had seized and were operating, the payment for 11 transports that were constructed by the Shipping Board and

turned over to the Army, and the conversion of United States Shipping Board ships for troop service, and other similar claims. These questions have all been submitted to the Comptroller of the Treasury for decision. It is the contention of the War Department to-day that we owe them little or nothing. We have made advance payments to them of \$53,000,000, and it is the belief of the War Department that that \$53,000,000 covers practically all of our liabilities. The decision of the comptroller will finally settle—and we should have it very soon—how much of the \$60,000,000 set aside will really be needed for Shipping Board claims.

Mr. EAGAN. Do I understand that it is the contention of the War Department that there will be very little of the \$60,000,000 that it will actually have to pay to the Shipping Board?

Gen. LORD. Yes; if the comptroller decides, as we think he should decide, or as we think he will, and sustains the contention of the War Department, it will be a comparatively small amount for charter hire that we will be compelled to pay, in addition to what we have already paid.

Mr. SLEMP. You stated a while ago that a part of the \$225,000,000 would lapse at the end of this year.

Gen. LORD. The most of it will lapse on the 30th of June.

Mr. SLEMP. On the second page of the letter to which you have referred you have items aggregating something over \$100,000,000 that do not lapse.

Gen. LORD. Those are the double-year appropriations, 1919–20, and those would be available through another fiscal year. Then there is one other item, inland and port storage and shipping facilities, of which \$4,000,000 will expire on June 30 next, but there is also included \$1,350,000 from a no-year appropriation which would be available until expended.

INLAND AND PORT STORAGE.

Mr. SLEMP. Does not that leave a balance in inland and port storage and shipping facilities that you are reserving, and not included in the \$194,000,000?

Gen. LORD. There will be a large balance from the way it looks now. I have called attention to that in the memorandum submitted to the committee—namely, that we think this amount we are recommending for cancellation will be increased at a later date, as we succeed in getting the reservations worked out.

Mr. SLEMP. Are not those reservations included in the work that Col. Hull is doing?

Gen. LORD. No; there is little or nothing there. This inland and port storage appropriation has been one of the most difficult problems in finance to straighten out. It is available for many purposes and was under the control of Gen. Goethals and used during the war in connection with war storage work and the construction of port terminals.

Mr. SLEMP. How much did you have as a total?

Mr. TAYLOR. The first appropriation was \$50,000,000; the second appropriation was \$147,000,000; and then there was a third appropriation of \$30,000,000.

Mr. SLEMP. A total of \$227,000,000?

Mr. TAYLOR. Yes.

Gen. LORD. These were apportioned for purposes in connection with the construction of port terminals, the acquisition of land, the engagement of services, and the purchase of supplies of all descriptions. There is a bill in the hands of the Committee on Military Affairs, House bill 13929, which will provide for the expenditure from this appropriation—provided that bill becomes a law—of something more than \$6,000,000. I think there are certain other claims in connection with these port terminals that are indeterminate today, but which I feel must be protected. For example, in the bill to which I have referred, a provision is carried for \$135,000 in connection with the Charleston port terminal, but there is a claim not included therein of approximately one million and a quarter which is dependent upon the decision of the comptroller. I am satisfied, however, that when we get the decision in the case it will be decided that we can not pay it, and in that way there will be that amount of money released. I have a statement here—the nearest statement we can make—which will cover what we have found under this appropriation.

The Treasury balance, June 30, 1920, was \$58,622,821.82; the obligations to February 1, 1921, were \$3,355,228.83; there have been apportioned to the various bureaus in connection with their storage activities, \$27,566,117.84; we have set aside for operations in 1922, to take the place of the \$10,000,000 estimated for in the Army bill, and which was eliminated on my recommendation, \$10,000,000; the amount required for land is \$6,000,000; the amount required to adjust Army Account of Advances is \$9,018,985; and the amount available to be repealed and covered into the United States Treasury is \$1,350,000; making a total of \$57,290,331.67, leaving available for obligations for the balance of the fiscal year \$1,332,490.15. That is a very tentative statement and I am satisfied that out of the amount apportioned to bureaus for the current fiscal year, \$27,566,117.84, there will be considerable money found available for repeal. I also believe that of the amount set aside for Army Account of Advances there are included some portions that are also carried in the \$27,000,000. We are working on it and this is the best we can do at this time.

Mr. SLEMP. Is the \$6,000,000 required for land in accordance with the bill that is about to become a law?

Gen. LORD. The bill is in the hands of the Committee on Military Affairs, but not reported.

Mr. SLEMP. Then it can not become a law this year?

Gen. LORD. The claims are still outstanding against this appropriation.

Mr. SLEMP. Would it require an act of Congress to make those amounts available?

Gen. LORD. I was not at the hearings and I do not know the character of the claims. I have set that aside tentatively, having in mind the possibility that that bill may become a law.

Mr. SLEMP. Apportioned to bureaus for current fiscal year operations, \$27,566,117.84, and amount required for operations, fiscal year 1922, \$10,000,000.

Gen. LORD. That is for next year.

Mr. SLEMP. That makes more than \$37,000,000, and that is an enormous amount.

Gen. LORD. Some of the bureaus have been carrying these apportionments for the past two or three years, and we are getting in many outstanding obligations; we are getting them in as rapidly as we can and settling them. As I tell you, I am satisfied that many millions of dollars from that source can be put into an unappropriated status.

Mr. SLEMP. Would we not be safe in returning to the Treasury \$10,000,000 out of this \$37,000,000?

Mr. TAYLOR. I do not think so.

Mr. SLEMP. Why not?

Mr. TAYLOR. Because we do not know what the overseas settlements will be on that; we do not know what the amounts will be when the auditor gets through with the foreign settlements.

Mr. SLEMP. What do you mean by that?

Mr. TAYLOR. When the auditor makes adjustments, he will charge against inland and port storage amounts that have been paid out of pay of the Army and general quartermaster funds.

Gen. LORD. I can explain it so that you can understand it. When the first quartermaster contingent went overseas in 1917, the absurdity of requiring them to estimate so much for pay of the Army, so much for regular supplies, so much for barracks and quarters, and so on, from 15 or 20 different appropriations, was so apparent that I, being in charge of Quartermaster Finance at that time, decided we would only give our disbursing officers one appropriation, and that "Pay of the Army." In 1917 pay of the Army would be the appropriation from which we would make the greater portion of our expenditures, as we would buy most of our supplies on this side. So all the disbursing quartermasters overseas during the first year of the war used pay of the Army for all quartermaster disbursements, and the auditor made the adjustments accordingly. During the next year, as we were then largely purchasing overseas, we used "General appropriations, Q. M. C.," and the auditor, as the accounts came in, made the charges against the proper appropriations. We very recently received a statement from the auditor showing a charge against General appropriations, Q. M. C., of \$27,666,752.17. That was charged against General appropriations and reduced our balance under that appropriation by that much.

Mr. SLEMP. You are still reserving another \$27,000,000.

Gen. LORD. No; that has been taken out. These settlements are coming in and I am satisfied we have ample funds, and that there are millions left available that we will later get at.

Mr. SLEMP. The inland and port storage now in foreign service would be only what you have in Germany.

Gen. LORD. We are not figuring on expenditures now, but expenditures made in 1918 and 1919 overseas. The auditor is behind in his accounts, and as he makes a settlement he goes back to 1919 or 1918 to make the charges against the proper appropriations.

Mr. SLEMP. That is very slow business. That is the only part of the Army I have noticed that has not shown some development.

Gen. LORD. The auditor's office, which is a Treasury Department activity, has been most efficient during the war. It has been over-

whelmed like everyone else by extraordinary conditions. It could not get clerks enough nor space enough to be current with its work.

NOTE.—The auditor's office will probably be current by June 30, 1921.

Mr. SLEMP. Is the entire situation in that shape, two or three years behind?

Gen. LORD. No; as I told you, this has been a most intricate appropriation because it was expendable for almost everything, and because at the time it was distributed very widely for expenditure.

Mr. SLEMP. In reference to the item of \$10,000,000 for operations this coming fiscal year, that was estimated, but you left the members of the committee under the impression that you would not need that much.

Gen. LORD. That was not the statement made. War Department witnesses supported their estimate of \$10,000,000 by testimony before the committee. My statement was that there was no need of a direct appropriation, because there was ample in this unexpended fund for the continuance of the work. I think they submitted a full and complete estimate for that \$10,000,000.

Mr. SLEMP. You have repealed \$5,350,000, \$1,350,000 of which would not lapse.

Gen. LORD. Yes. I have given to the committee everything I know about this matter—the best estimate I could make. If the committee sees fit to make any further cuts, it is for the committee to assume that responsibility. I was afraid to recommend anything more, and believe that before the end of the fiscal year we may be able to give the committee something more definite. On page 921 of the hearings on the Army bill before the subcommittee of the House Committee on Appropriations, current year, you will find the supporting statements covering the \$10,000,000 for 1922.

Mr. SLEMP (reading):

Mr. ANTHONY. We want in the hearing a statement of the items of this proposed expenditure for the fiscal year 1922 for inland and port storage because it might be felt advisable to eliminate some of them and we might want to provide in the bill that such action may be taken.

Not having appropriated anything for it at all——

Gen. LORD. You considered it because you made the provision in the bill as it passed the House that a certain portion of the amount that was still available, previously appropriated, could be utilized for a certain purpose.

Mr. SLEMP (reading):

Mr. ANTHONY. Would it not be a good business proposition to have those moneys revert to the Treasury and reappropriate them in accordance with the necessity?

Gen. LORD. That would be the proper procedure when the obligations for the settlements of which these moneys are held are finally determined.

But you have kept the money back here for operation.

Gen. LORD. That was the statement I made, that there were ample funds for the operations of the next succeeding year. I do not hold a brief for the other bureaus but they are paying their salvage work and the handling of their surplus stocks and things in storehouses and storage depots, as I understand it, largely out of this appropriation, and the Army salvage work is a source of revenue to the Government at the present time.

Mr. SLEMP. In any event, I do not see how this committee could get hold of it.

Gen. LORD. This statement will be submitted to the Senate Committee on Military Affairs. You will find my statement on this appropriation, Mr. Chairman, beginning at the bottom of page 911, House Appropriations Committee hearings, which I think sustains my attitude. We did not have this information available at that time. I was satisfied we had ample funds, and Mr. Taylor, of my office, has been working on it and is working on it now. I think, as I have stated, that eventually more millions can be squeezed out.

Mr. SLEMP. Have you anything else to submit, General?

ORDNANCE MATERIAL AND PROCEEDS OF SALES.

Gen. LORD. You asked me recently in connection with the statement submitted repealing the \$225,000,000, if that included all balances remaining unutilized but available for expenditure. There is an indefinite appropriation of an amount equal to the "proceeds of sales of surplus ordnance" by the War Department covered into the Treasury to be applied for the purpose of procuring a supply of material adapted in manufacture and caliber to the present wants of the service. Then, there is a restrictive provision that there shall be under this provision not more than \$75,000 expended in any one year. That is the act of March 3, 1875. During the war the receipts from that source were very large, and there is to-day, or was in the Treasury on February 10, 1921, a balance of \$6,631,364.88 under that appropriation, while the Ordnance Department is limited in its expenditures to \$75,000 a year.

Mr. SLEMP. Could we not put in a provision and in some way cover that money into the Treasury?

Gen. LORD. I would like to consult with the Chief of Ordnance first. I do not think he could have any objection to the greater part of that balance being covered into the Treasury.

Mr. SLEMP. We might deduct the \$75,000 for the next fiscal year. Has the Chief of Ordnance been expending the \$75,000?

Gen. LORD. I will read to you a table of the receipts and expenditures. The receipts for the fiscal year 1915 were \$85,155.16, expended \$52,478.66; fiscal year 1916, receipts \$131,008.09, expended \$72,544.47; fiscal year 1917, receipts \$185,217.45, expended \$36,204.39; fiscal year 1918, receipts \$248,129.84, expended \$47,224.58; fiscal year 1919, receipts \$4,158,352.77, no expenditure; fiscal year 1920, receipts \$1,233,013.96, expended \$2,620.66; receipts for the fiscal year 1921 up to February 10, \$65,385.37.

Mr. SLEMP. Have there been any expenditures?

Gen. LORD. No expenditures have been reported yet for 1921.

Mr. TAYLOR. That \$75,000 is set aside each year.

Gen. LORD. There is set aside at the beginning of each year \$75,000, and we then see that no one overexpends, overdraws, or overobligates that amount.

Mr. SLEMP. Do you think it would be advisable to put in a provision returning that money except \$75,000, which could be expended next year, and also provide that any amount in excess of \$75,000 would be covered into the Treasury?

Gen. LORD. You can always get the money. I do not see any objection to it, except I am a little afraid always of restrictive legislation of that character.

Mr. SLEMP. Will you talk with the Chief of Ordnance about it?

Gen. LORD. I will see the Chief of Ordnance or have some one take it up with him.

Mr. SLEMP. Have you anything else in mind where some money can be covered into the Treasury?

Gen. LORD. You will find in the hearings before the Senate Committee on Military Affairs last year on the Army appropriation bill a long list which I prepared and submitted showing a number of small appropriations with balances from no-year appropriations covering specific projects, and eventually we want to clean those up.

Mr. SLEMP. Yes; this was simply intended as a general cleaning up of the claims proposition and the war business.

Gen. LORD. Yes; and we are glad to do it.

UNEXPENDED BALANCES COVERED INTO THE TREASURY.

Mr. SLEMP. And I want to thank you on the part of the committee for the service you have rendered us. I think it has been splendid. The total figure is about \$1,000,000,000, the greater portion of which may have been obligated or expended.

Gen. LORD. As I previously said to you, I think the attention of the general public should be called to the fact that the War Department has not expended all the money that has been given to it, when it might have done so if it wanted to.

Mr. SLEMP. In addition to returning this money to the Treasury from unexpended balances, I believe, General, you have been active in making settlements with various companies and individuals on war contracts whereby you have had them, through your inspection and auditing, return to the Government money that had been previously paid by the Government to those companies, corporations, or individuals, and that amounts to about how much?

Gen. LORD. You refer to our system of contract auditing. We have been auditing the disposition and use of Government property which was issued during the war to Government contractors engaged in making munitions, and as a result of our contract auditing we have found due and are collecting or have collected from these contractors something more than \$24,000,000 to date.

FRIDAY, FEBRUARY 11, 1921.

HIGH-EXPLOSIVE SHELLS.

STATEMENT OF MR. W. S. ISHAM, 1443 B STREET NE., WASHINGTON, D. C.

Mr. SLEMP. Mr. Isham, will you state to the committee what your business is and has been.

Mr. ISHAM. My business is presenting materials of war to the Congress and to the people of the United States, and I have devoted 22 years exclusively to that subject.

Mr. SLEMP. Are you a manufacturer?

Mr. ISHAM. I have manufactured some shells for the United States Government.

Mr. SLEMP. Have you a manufacturing establishment?

Mr. ISHAM. I have not.

Mr. SLEMP. Do you prepare designs and submit those designs to Government authorities?

Mr. ISHAM. I have prepared designs of all kinds of implements and have presented them.

Mr. SLEMP. You are interested in the subject of shells, as I understand it, and the use of shells in the Army, particularly with reference to the seacoast defenses.

Mr. ISHAM. I am interested in that as one of the devices which I wish the Government to use.

Mr. SLEMP. And you are also interested in the field artillery shells?

Mr. ISHAM. I am deeply interested in that subject, not only because of having ideas about that but also as a taxpayer.

Mr. SLEMP. Of what calibers of guns do you wish to speak?

Mr. ISHAM. I wish to speak on calibers of 6 inches and larger.

Mr. ANTHONY. I would like to ask a question right there. Mr. Isham, you were one of the pioneer advocates, were you not, of the use of the high explosive shell as opposed to what they call the armor-piercing shell?

Mr. ISHAM. I was the pioneer.

Mr. ANTHONY. I recall that you appeared before the Military Committee several years before the war which has just closed, advocating the use of high explosive as against the solid shell, and I want to ask you whether the lessons of the late war have demonstrated that the use of the high explosive which you then advocated was correct.

Mr. ISHAM. The high-explosive shell. The World War demonstrated that the high-explosive shell, as advocated by me, was the main thing in determining the results; and, moreover, it was the misstatements uttered concerning the relative effects of high-explosive shells and armor-piercing shells which caused the World War, which prolonged the World War, and finally brought us into the war; and if I may add, which I believe now causes certain people to prevent the facts concerning high-explosive shells from becoming known.

Mr. SLEMP. The shells used by the larger size guns in the Field Artillery are now and have been high-explosive shells, are they not?

Mr. ISHAM. In the broader acceptation of that term, they are all high explosives, but there is a difference between what experts call the high-explosive shell and the armor-piercing shell.

Mr. SLEMP. The Field Artillery shell is and has been——

Mr. ISHAM. You mean used by the mobile army?

Mr. SLEMP. Yes; that is a high-explosive shell.

Mr. ISHAM. All shells are high-explosive shells. Black powder is not used any more.

Mr. SLEMP. It is not an armor-piercing shell.

Mr. ISHAM. The high-explosive shell is not an armor-piercing shell.

Mr. SLEMP. Therefore, you would be interested, so far as this committee is concerned, in seacoast-defense ammunition.

Mr. ISHAM. That is the only province of this committee, as I understand it.

Mr. SLEMP. It also has charge of the Field Artillery, but you are not addressing yourself to that feature.

Mr. ISHAM. There are certain features of it; yes. The fuse matter is vital to artillery and I am deeply interested in the fuse question. I ought to say right in that connection that there was a very large percentage of guns blown to pieces in France because those in charge would not allow proper fuses to be used with our ammunition, and this resulted in blowing a large number of guns to pieces.

Mr. SLEMP. Mr. Isham, would it interrupt you if I should say there that the Army admits that it does not have a suitable fuse, and spent several hundred thousand dollars last year in attempting to get a fuse, and they are asking for a lot of money for next year to work out a suitable fuse.

Mr. ISHAM. I am glad if the Army is willing to do something to remove what I consider a menace to our national defenses.

Mr. SLEMP. What I am stating to you is that that was done last year.

Mr. ISHAM. Have they completed the fuse matter, then?

Mr. SLEMP. They have told us in the testimony here, of which we will give you a copy, that they have made progress with the fuse, but there are very many kinds of fuses—the mechanical time fuse or the percussion or the constant pressure fuse, and other kinds of fuses—and they are working on them all.

Mr. ISHAM. Yes, sir; that is very nice.

Mr. SLEMP. Now, then, you have a contribution that you want to make to the subject of fuses?

Mr. ISHAM. If I am to go into the subject of small-shell fuses, it will take considerable time and will I then have time to speak on all the other matters?

Mr. SLEMP. Let us see just what it is you want to take up. You first want to take up the fuses on all shells and then the structure of the seacoast ammunition, which is from 6 inches up, except in the antiaircraft, which is smaller—

Mr. ISHAM (interposing). The same ammunition would be valuable for antiaircraft purposes if it was of the high-explosive kind and had the proper fuse. It would operate efficiently against battleships, destroyers, submarines, and aircraft of all types.

Mr. SLEMP. Now, what have you to say, or what suggestions have you to make in regard to the shell as now accepted by the seacoast-defense authorities as the best type of shells for use against naval vessels for the purpose of penetrating armor plate?

Mr. ISHAM. All I have to say is that I have a written statement here, which I wish to have printed as my presentation of this matter. What I wish to say separate from that is that there are two schools of thought on the subject of shells. The one believes in the large-capacity high-explosive shell, which carries its destructive force within the shell, and the trajectory is only a means for laying this destructive force down at the place it is desired to employ it. The other believes that the destructive force of a shell is contained in the energy of velocity and weight which it carries, and the explosive charge is light. I am an exponent of the large-capacity shell—the shell tested and recommended by the Fiske Board for the United

States Navy. Heretofore in all countries the armor-piercing variety has only been used for attacking ships; but this shell was proven by the World War to be practically worthless for the purposes for which it was designed.

In 1915 or 1916, during the hearings on the naval bill, representatives of the Bethlehem Steel Co. and the Carnegie Steel Co. were before the Naval Affairs Committee and stated that it was impossible to make armor-piercing shells that would penetrate armor where the armor made an angle with the path of the projectile of more than 15°. Their testimony is voluminous on this point, and they testified that they had spent millions upon millions of dollars in trying to accomplish this end and had thrown up their contracts and forfeited everything because it was impossible of attainment. At the same time, or previously, Joseph Strauss, then Chief of Naval Ordnance, asked the committee to put into the bill an item by which he might purchase all of the armor-piercing shells necessary for the Navy from English companies. He said the English had a shell which would penetrate and would never break up under those conditions. Now, what were the facts? Admiral Strauss said he could buy those shells in Great Britain. He said they had them. It was like so many other statements made to the Naval Affairs Committee and made to other committees of Congress which are lacking in one essential particular to make them of much value, and that is—truth. I have here a copy of *The Grand Fleet, 1914–1916*.

Mr. SLEMP. You are not going to read that book to us.

Mr. ISHAM. No; I just want to read a little from it. I have not had time to prepare. I was not expecting this committee would be so good as to honor me with a hearing.

Mr. SLEMP. We told you about it yesterday morning, Mr. Isham.

Mr. ISHAM. I understood you to say you would try to hear me.

Mr. SLEMP. No; that we would try to hear you on yesterday.

Mr. ISHAM. I will read just a few paragraphs:

Later, during my period of service at the Admiralty as First Sea Lord, and under the immediate direction of Capt. Dreyer, then director of naval ordnance, a new design of armor-piercing projectile, with a new type of burster and an altered fuse, was introduced for guns of 12-inch caliber and above, which certainly doubled their offensive power.

That is after stating they failed to penetrate.

Mr. ANTHONY. Who is making that statement?

Mr. ISHAM. This is Admiral Jellicoe, who commanded the Grand Fleet at Jutland, and he was an ordnance man.

The pressing need for a better armor-piercing projectile with an improved fuse was also revealed.

I won't encumber the record, but I just want to read a little from page 69:

With one of the old type of armor-piercing shells of a particular caliber as used at Jutland—

That was on the 5th day of May, 1916, two years after Admiral Strauss said that the British possessed a shell which would penetrate at an angle of 15°.

With one of the old type of armor-piercing shells of a particular caliber as used at Jutland the shell would, with oblique impact at battle range, break up whilst holeing a certain thickness of plate, and the shell could not, therefore,

reach the vitals of the enemy's ships. A shell of the new type and same caliber, as produced by the 1917 committee, would at the same oblique impact and range pass whole through a plate of double thickness before exploding, and could therefore, with delay-action fuse, penetrate to the magazines of a capital ship.

Just before that he had stated they could not do anything because they could not get in. These facts had been determined in this country three or four years earlier by tests carried out by the Congress under the direction of Capt. Hobson, and if these facts had been admitted and the facts concerning high-explosive shells, the British fleet would have been provided with efficient shells and won the battle and ended the war in 1917. Instead, there has been circulated in the committees of the Congress gross misstatements as to armor penetration, and, furthermore, that the British at Jutland employed large-capacity high-explosive shells, which caused the loss of that battle. That story has been peddled around here, not only at this end but also at the other end of Congress, and I wanted to read this to show that the British used an armor-piercing shell, and Admiral Jellicoe, who was an ordnance officer, goes on to show how he improved his armor-piercing shell so it would go through, and in every case he calls it an armor-piercing shell. Now, while I am on this armor-piercing business, I want to say something else. There was one of God's great men—the rarest of men, an honest man—on the Naval Affairs Committee, that came to me right after that young man of the Balfour commission testified that they used high-explosive shells. This Congressman came to me and he said. "They are testifying that they used at Jutland the high-explosive shell."

I went at once and saw another one of God's great men, Admiral Earle, who was then chief of Naval Ordnance, and he said, "I do not believe there is a word of truth in that. I do not believe they used your shell. I believe they used armor-piercing shell." There is going to be an investigation in two or three months and I hope to have Admiral Earle on. He gave me a card to Admiral de Chair, who was the highest man on that commission, and he stated there was not anything in it, that they used armor-piercing shells, and that those shells broke up because the Germans zigzagged and could not get penetration with any shells if the armor was at an angle. For years the lecturers at Great Britain's War College have stated that ships will always zigzag in battle not only to defeat the enemy's range finding but also to defeat armor penetration. All authorities in all countries state that there can be no penetration where the angle is greater than 20 degrees.

I now want to puncture one more bubble. It is now put forward that by using a 16-inch shell they can accomplish what they can not accomplish with the 14-inch, and here is a little book on that subject, the official organ of the War College.

Mr. SLEMP. What is the date of that?

Mr. ISHAM. November, 1920. It is called "Journal of the United States Artillery." In this article, in making an argument for 16-inch shells and 16-inch guns, it goes on and states that the 14-inch can not do anything beyond 12,000 yards against the side armor, but it can at about 29,000 yards get through the decks.

Mr. SLEMP. Will you read that quotation?

Mr. ISHAM (reading):

Two fundamental considerations must be satisfied by armament to be successfully used in seacoast defense. One is that the weapons must be capable of accurate and rapid fire; the other is that they must be placed in positions from which they can reach the classes of naval vessels against which their fire is efficacious. The armament considered necessary by all authorities for use in seacoast defense is divided into primary (major caliber) and secondary (intermediate and minor). The primary armament should consist of weapons capable of penetrating the most modern type of battleship, either through its deck or through its side. This can be accomplished effectively by the 16-inch guns and the 16-inch howitzers now approved as the standard for major caliber fixed emplacements.

The largest gun contemplated at the present time on railway mounts is the 14-inch, with a penetrating power sufficient up to 7.5 miles to pierce the 15-inch side armor of the latest designed type of battleship, and from 16.9 miles to 22.8 miles capable of piercing the deck of this battleship. As compared with the 16-inch gun on fixed emplacement, this is relatively inefficient, inasmuch as the latter will pierce the side or deck armor effectively at all ranges up to 45,000 yards; the side armor, as far as 12.8 miles; and the deck, from 6.2 miles to 25.5 miles range.

Then it shows that this leaves a wide zone in which the ship lay and attack our defenses and be immune from gunfire. I wish now to show that that is a misstatement of facts. It is a fact if you will accept and allow the Ordnance Department of the United States to dominate in the matter of the projectiles to be used, but it is an absolute falsehood if you will allow the honest men composing 95 per cent of those in the service to dictate what the type of projectile will be after both have been tried in a competitive test. A single high-explosive shell of either 14 or 12 inch caliber will put out of commission any battleship afloat, including our latest dreadnaughts.

Mr. SLEMP. Would it interrupt your story if I asked a question there.

Mr. ISHAM. Not at all.

Mr. SLEMP. Most of what you say there, I think, is admitted by the War Department so far as I have been able to interpret the hearings. What description of shell have you got to submit and have you submitted it to the War Department authorities?

Mr. ISHAM. The shell which the Fiske Board recommended this administration to adopt; as necessary for the service but which was turned down.

Mr. SLEMP. Let us take a 16-inch shell then.

Mr. ISHAM. I will challenge the 16-inch shell.

Mr. SLEMP. Let me ask you the question. You said it would not interrupt you. Describe your 16-inch shell.

Mr. ISHAM. May I suggest that I think it is all wrong to talk about something that is not necessary. Why could we not use the 14-inch and make the guns we have valuable. Perhaps before many years or before 16-inch guns can be mounted battleships may not be used. If any battleship afloat can be destroyed with the 14-inch gun, why need we discard such guns and construct 16-inch guns. Let us have efficiency with what we now have.

Mr. SLEMP. Can you give us the difference between the shell you have in mind for adoption and the ammunition adopted by the War Department for seacoast defenses?

Mr. ISHAM. Yes, sir. In order to do that I wish to state what the requirements are.

Mr. ANTHONY. Before you get down to describing the type of shell, I want to lay a little more groundwork. Mr. Isham, it has been stated to the committee here that the type of shell which our coast-defense gun would now use and was intended to use against a hostile ship at long range would be of the armor-piercing type, which carries a comparatively small charge of high explosive, which is intended to explode inside the vessel after the armor is penetrated.

Mr. ISHAM. Yes, sir.

Mr. ANTHONY. Now, I want to ask you, is it possible to fire a shell containing a large amount of high explosive, sufficiently large so as to damage a battleship if exploded on the outside of the ship?

Mr. ISHAM. Why, sure. There are several themes in your question, as I look at it. There are several ways of putting a ship out of action. First. The turrets at Liege and Namur were thicker than any turrets of battleships. They were shaped like an old-fashioned beehive, this way [indicating]; they were thicker than any of the turrets on any of the battleships, and the photographs show that they were blown to pieces by the high-explosive shells, and that they were not penetrated. Furthermore, the shells were fired by howitzers and had neither the thickness nor the velocity to penetrate even thin armor.

Mr. ANTHONY. The statement was made in this committee the other day, I think by a representative of the Coast Artillery, that even if it were possible to fire a shell containing a large amount of high explosive of the type you state it would inflict comparatively no damage if exploded against the armor belt of a battleship.

Mr. SLEMP. I want to put in the record this statement, if you are going into this: I went to those fortifications at Liege last summer, and I was told on the ground that the destruction was caused by the striking of the magazine, and that it was the explosion of the magazine that destroyed the turrets.

Mr. ISHAM. How did it get to the magazine?

Mr. SLEMP. The magazine had a very small dirt covering—

Mr. ISHAM (interposing). That is very singular. In 1900 it was my privilege to be at the great world's fair in Paris for six months; I had an exhibit in the center of the naval exhibit, and you can see by looking at the official photographs [indicating]. There is my exhibit. It was my privilege to go into the French exhibit, next to it, where were exhibited the same steel turrets that were placed at Liege and Namur. Now, their magazines were absolutely protected by the steel turrets and barbette construction. The ammunition was so placed that you would, of necessity, be compelled to penetrate the armor in order to get through and explode inside so as to explode the magazines. This is the first time I have heard a man say that you could penetrate anything with these large high-explosive shells that the Germans used. I do not believe that they would penetrate 2 inches of armor without breaking up, and it would be impossible to get through the armor and to those magazines. The photographs do not show penetration in a single instance, but do show where the large charges exploded that blew them in pieces. If the magazines had exploded, the turrets would have been thrown out as an entirety. Instead of that, they are broken up by radial cracks from the point of impact of the shells.

Mr. SLEMP. Have you visited Liege since the destruction took place there?

Mr. ISHAM. I have not, but I have seen all of the official photographs, and there are many officers, including Gen. Mitchell, who looked at them very thoroughly and will testify that they were broken all to pieces by the explosive charge. The photos even show the intense heat at the point of impact, and you can tell just where the projectile struck that blew the turret to pieces.

Mr. ANTHONY. You did not answer my question. Would a charge of that kind, exploding against the armor belt of a modern ship, destroy the ship?

Mr. ISHAM. Yes. We had this same argument come up in 1908 and 1909, and we had the Puritan test to settle it, and we got the same result; we blew in the turret with one explosion and sunk the ship with another——

Mr. ANTHONY (interposing). How are you going to fire a charge of that kind?

Mr. ISHAM. The same as you would fire any other charge. Nobody has ever denied the safety of this shell in the gun, as T. N. T. is the explosive used.

Mr. ANTHONY. What is the largest amount of high explosive you can fire in a 12-inch or 14-inch shell?

Mr. ISHAM. The 14-inch, to make it a good shell, would be about 275 pounds.

Mr. ANTHONY. How far could you carry that?

Mr. ISHAM. As far as any shell will go, absolutely; there is no difference in the range of shells whether they be A. P. or H. E. Have I answered that enough? If I have, I want to tell about the test on the *Puritan*. The effect of high explosive shells had been disputed and the charge was placed against the armor of the ship and exploded to determine its effect and settle this question. It was first put up against the turret and it knocked in the side, blew the top off, bent the guns, and wrecked the turret so that it could not turn. Incidentally, just before that they had fired an A. P. shell against the turret of the *Texas*; it did not do anything. A test on the proving ground is one thing, but it is another thing to get results in battle.

Mr. ANTHONY. That is, at the test you always hit the target with a square impact?

Mr. ISHAM. That is the way they do it on the proving ground; but out there at battle ranges and under battle conditions it is a different proposition. I want to say something about the armor-piercing shell. If the enemy would be obliging enough to place their sides exactly normal, it might be that armor-piercing shells would penetrate, but, unfortunately, the enemy will not do that, and as a result penetration of armor in the whole war was never achieved. Not a shell went through the outer armor and through the protective deck and burst inside. It is one thing to get through the first armor, but if you are going to affect the vitals of a ship with armor-piercing shells you have got to get through the outer armor and then through the protective deck. And I challenge the champions of the armor-piercing shell to furnish an instance where they went through the outer armor, the protective deck, and exploded inside. All authorities state that there was never a single instance when this was done.

Mr. FRENCH. Will the witness tell me what he means by "the gang"?

Mr. ISHAM. That will develop in the course of—

Mr. ANTHONY (interposing). I would suggest that you leave out all reference to the gang.

Mr. FRENCH. I think he ought to state whom he means by "the gang" right now, because I think the committee ought to know.

Mr. ISHAM. I refuse to answer that right now.

Mr. SLEMP. We are extending you the courtesy of a hearing and we want the benefit of your information. The other departments of the Government are represented here and I suppose you are referring to them. Let us leave out personalities, insinuations, and indirect attacks and get to the point of stating the recommendations you think it would be useful for this committee to consider, knowing that whatever recommendations this committee makes will be submitted to Congress. Leave out all personalities.

Mr. ISHAM. I will do so, if I am permitted.

Mr. FRENCH. That is not satisfactory to me; but, of course, I am simply one member of the committee. Some time ago I went to the chairman of the committee and asked that Mr. Isham be granted a hearing, and I am anxious that he be heard; if he has any information to impart we ought to have it, but I do feel that when the witness refers to certain people as "the gang" we ought to know to whom he refers. I have no prejudices in the matter either way, but am simply interested in knowing to whom he refers.

Mr. SLEMP. Suppose we strike out that word.

Mr. ISHAM. I will gladly obey any suggestion of the gentleman from Virginia.

Mr. FRENCH. But I think we ought to know to whom he is referring now, leaving out the word.

Mr. SLEMP. Of course, I suppose we all know.

Mr. FRENCH. I do not know.

Mr. SLEMP. You refer to somebody in the War Department, do you not?

Mr. ISHAM. I say simply that a condition exists—it has been said before in the Congress that such a condition exists.

Mr. EAGAN. Why do you fix it during the last eight years?

Mr. ISHAM. I will answer that, if the gentleman will permit me.

Mr. SLEMP. Mr. French, Mr. Eagan, Mr. Anthony, and myself are of equal standing on this committee, and when they ask you questions I think it is your duty to answer them. Mr. French has asked you to elucidate what you mean by saying "the gang."

Mr. ANTHONY. My object in wanting to hear Mr. Isham was merely to get some idea as to the differences in the merits of the armor-piercing and high-explosive shell.

Mr. SLEMP. And I thought you brought out a very fine question.

Mr. ANTHONY. And that is as far as I think the committee ought to go. We want it for our information to determine how much money we ought to appropriate.

Mr. SLEMP. I was doing my best to try to get a clear view of what was in your mind, but you are ranging over everything.

Mr. FRENCH. I think the outline that has been suggested of what I have in mind—the suggestion both of the chairman and of Mr. Anthony—is absolutely correct, but when the witness of his own

volition chooses to go beyond that and indicates certain persons as being members of a gang, I think we ought to know to whom he refers. I do not know to whom he refers, maybe because this is my first term on this committee, and it seems to me that the assertions he has just made are most important.

Mr. ANTHONY. The chairman has been very correct in asking him to proceed without any reference to gangs.

Mr. SLEMP. Let me see whether we can get back to bedrock. Mr. Anthony asked you a question which seems to be at the bottom of this proposition. You contend that any theory involving penetration is a wrong theory and, therefore, that you must carry a shell or construct shells carrying a much larger amount of internal explosives and not rely on penetration, but upon exploding against or in the neighborhood of the object to be struck.

Mr. ISHAM. That is absolutely correct.

Mr. SLEMP. Is that your theory?

Mr. ISHAM. Yes, sir. It is theory established by results obtained in the World War.

Mr. ANTHONY. You say it is possible to fire high explosive charges of that kind through the present guns that we have in our coast defenses at long ranges with effective results. Now, I want to ask you again: The statement was made in this committee that it was not possible to fire these large charges of high explosives at long range to get those results, but that it might be possible to send them under water, as in the case of a torpedo. Now, I have heard some reference to what is called the diving shell, and I believe you claim to have invented some such shell as that. How do you fire that—from what kind of a gun, from what ranges, and what does it carry?

Mr. ISHAM. We constructed shells of that type in 1912, and they were tried out by the Fiske Board. They were attempting to determine some of these points which I am trying to lay down before this committee. First, their range. Now, these gentlemen can tell you, by looking up the data obtained by that board. "The coefficient of form" of my shell is about 0.9. That was determined by working back from the ranges. "The coefficient of form" of the long point is 0.6 and that of the flat point is 1.2. Therefore it showed the relative range of these projectiles. Now, this is what is called the diving shell. It has a cup-shaped point; the cup causes it to dive. Now, to determine whether it would dive or not shots were fired and it was found that at all ranges above 8,000 yards all shells will take the water and continue their trajectory under water for a distance of from 150 to 180 feet as stated in the report.

Mr. SLEMP. Is that a long report?

Mr. ISHAM. It is quite long, but it is material that ought to be put in, because the statements are made here that this can not be done and it ought to be established officially.

Mr. SLEMP. I would not want this to be the means of publishing another Government publication.

Mr. ISHAM. I think the facts should not be suppressed for the want of publication. The path of this projectile under water was secured by a series of nets which were placed at certain distances apart in the water, and when these projectiles struck the water they made holes through those nets, from which we plotted their under-water trajectory. We made the tests with a 2,400-foot initial velocity and a fir

ishing velocity of about 1,800 feet, 1,750 feet—we secured runs ranging between 150 to 180 feet, as will appear in the official report. Now, then, the effect of this has been to make every shell striking shoot either a torpedo or mine. This shell as designed would only give a range of about 17,750 yards, and as it might be necessary to fire at a greater range I provided and presented a long point, a friable point, which could be employed for those very extreme ranges, breaks off when it strikes the water, and the shell dives just the same. The Fiske Board found that that point gave the shell the same range as any projectile, and it has the same diving feature. Consequently, this shell becomes a diving shell at all ranges beyond 8,000 yards.

Mr. ANTHONY. After this so-called diving shell reaches the water at a certain angle, does it immediately flatten right out?

Mr. ISHAM. No, sir; it continues on at very nearly the same angle.

Mr. ANTHONY. You would have to strike very near the side of a ship, then, in order to hit it, even with a diving shell?

Mr. ISHAM. The shots striking within 50 feet would explode against the ship and have the effect of torpedoing. All shot striking from 50 to 150 feet away will go under the ship and explode under her bottom. There is no defense to-day—and there is none possible—for any ship against even a shell exploded underneath the bottom.

Mr. ANTHONY. You would have to hit that ship in order to explode the shell?

Mr. ISHAM. Not a bit of it; it explodes by time, a half second after striking the water.

Mr. SLEMP. Does it change its mind in accordance with the speed of the vessel?

Mr. ISHAM. That would be according to whether it strikes thick armor, thin armor, or water, and I want to go into that.

Mr. SLEMP. What you really mean is that it carries a time fuse.

Mr. ISHAM. It carries a time fuse, and if it does not hit anything before it has finished its run and is under the ship it will explode where there are no blisters or anything to save the ship. The engines, boilers, turbines, and all those things are on the bottom and an explosion is necessarily fatal.

Mr. ANTHONY. In the experiments on the *Indiana* the other day did they use gunfire?

Mr. ISHAM. No; they dropped that down by the side.

Mr. ANTHONY. Did they use high explosives?

Mr. ISHAM. Yes, sir. But there was nothing new about that, and yet some people wanted that kept secret, but why I do not know, because there was nothing to keep secret.

Mr. ANTHONY. You mean that a charge of high explosives exploded within that distance of the ship will sink it?

Mr. ISHAM. Yes, sir; but more particularly will it sink it if it is under the ship. Take these dreadnaughts that are being built now, the so-called unsinkable dreadnaughts; they can be sunk with 6-inch shells. That is a pretty nice state of affairs, is all I have got to say about it.

Mr. ANTHONY. How are you going to sink it with a 6-inch shell if it is divided up into 8 or 10 compartments?

Mr. ISHAM. There are no compartments under the bottom, and when it blows up through there her motive power is put out. The

blisters, so-called, are built from the bilge up. They are not under the bottom; so that any explosion under the bottom of the ship sends it to the bottom.

Mr. ANTHONY. What would be involved in a test of this high-explosive shell? Can shell be secured which can be fired from any of our 12-inch coast defense guns?

Mr. ISHAM. Sure.

Mr. ANTHONY. Which will demonstrate what you say?

Mr. ISHAM. Sure.

Mr. ANTHONY. How long has it been since such a test has been held?

Mr. ISHAM. There has been none held in this country.

Mr. ANTHONY. None since the war?

Mr. ISHAM. No; not that I know of.

Mr. ANTHONY. Where would you get those shells?

Mr. ISHAM. Why, manufacture them up here in the national projectile works.

Mr. SLEMP. What works?

Mr. ISHAM. Our projectile works. The Navy Department has projectile works, and they can make them cheaper than any other because they do not have that expensive point on them. Now, they go on and put in vanadium and all these other things and run up a very expensive shell, whereas a shell such as I am talking about is a cheap shell.

Mr. SLEMP. Is there a patent on those shells?

Mr. ISHAM. Yes.

Mr. SLEMP. Who has that patent?

Mr. ISHAM. I am the man, and I offered it free to this Government if it would be tested out.

Mr. SLEMP. When did you get your patent?

Mr. ISHAM. Along in 1914, and they are all covered up in fuse patents.

Mr. FRENCH. Do you come here representing yourself alone or do you represent an organization or a group? This committee ought to know for whom you speak.

Mr. ISHAM. I represent 100,000,000 of people, less a few people.

Mr. FRENCH. No, no; I mean specifically. Do you come here alone or do you represent a company or an association?

Mr. ISHAM. I represent myself only as a taxpayer and as a citizen of the United States.

Mr. ANTHONY. And as an inventor?

Mr. ISHAM. And as an inventor, as I testified at first, of types of implements of warfare.

Mr. FRENCH. And are those types covered by patents?

Mr. ISHAM. Yes, sir.

Mr. FRENCH. Then are others associated with you in advancing money to bear your expenses in any way for experimentation or development work looking to the devices that you have covered with patents?

Mr. ISHAM. Oh, no, no.

Mr. FRENCH. You stand alone?

Mr. ISHAM. I stand alone.

Mr. FRENCH. Have you been in the employ of the Navy Department or the War Department?

Mr. ISHAM. Oh, no. I have studied up War Department materials as a subject, the same as I would undertake any subject in engineering, because it pleased me to study those subjects, and I have read and studied everything that I could get hold of. My ideas are the ideas of all the men whom I believe are working in the department for the interests of the people of this country.

Mr. FRENCH. Has the War Department ever furnished you with money for your experiments?

Mr. ISHAM. The War Department has never furnished me with money for my experiments, but they have conducted experiments.

Mr. SLEMP. Just wait a minute.

Mr. FRENCH. Has the Navy Department furnished you with money or with supplies in its plants for your experiments?

Mr. ISHAM. The Navy Department has carried out experiments with a device which I perfected. The Fiske Board carried out tests to determine whether such a shell would be valuable, and they recommended the adoption of such a shell.

Mr. FRENCH. Those were the points I wanted to bring out, Mr. Chairman.

Mr. ISHAM. May I continue a little further? The real milk of this question about H. E. shells is this: They are a mine or torpedo that is fired through the air and has the accuracy and range of any shell. The World War showed what mines and torpedoes would do. Now, I wish to say that the armor-piercing shell is practically worthless, as borne out by the results of the Jutland fight—I wish to say that the armor-piercing shell does not do much harm. Admiral Strauss stated that the armor-piercing shells used by the Germans were the height of perfection. The British dreadnaught *Warsprite* jammed her rudder in the Battle of Jutland and made several turns around at close range to the German fleet. According to Admiral Jellicoe and other English authorities, she was hit over 40 times with major-caliber armor-piercing projectiles.

Mr. ANTHONY. Armor-piercing projectiles?

Mr. ISHAM. Yes, sir; with armor-piercing projectiles, which Admiral Strauss says are the finest in the world. I want to say that the shells that they used were largely 15-inch shells; and I want to say that the 16-inch shell, which it is proposed to adopt here, has the same point on it as the 12-inch shell and the 14-inch shell, which breaks off and defeats penetration at oblique impact. Hence English authorities say that the 16-inch shell is no better than the 14-inch shell.

Mr. ANTHONY. What happened to the *Warsprite*?

Mr. ISHAM. She was hit over 40 times, and the report shows that her fighting efficiency was not seriously harmed. Admiral Jellicoe, in emphasizing the power of underwater explosion, stated afterwards that a single torpedo hit was more effective than all of the 40 hits by the armor-piercing shells. I argue, therefore, that there is proof that you can not put any warship out of commission by an A. P. shell with less than 50 hits. Now, in order to get 50 hits with armor-piercing shells, Admiral Jellicoe in his book says that from 60 to 80 per cent of strikes are in front of the ship.

Now, from 60 to 80 per cent strikes are in front, and not a single one of those, if they are A. P. shells, are effective. On the other hand,

no man will say that a hundred pounds of explosives under the keel of a ship will not blow it up. These diving shells become destructive mines if they strike short. The armor-piercing shells do not amount to anything when they strike short or strike armor plate at a glancing angle.

Mr. SLEMP. I do not want to go over the whole history of this.

Mr. ISHAM. The experience of the whole war showed that a vessel is controlled from the top part of the ship, by the observation station. Now, the armor-piercing shell is not worth anything against the top.

Mr. SLEMP. That is your view, and you contend that the high-explosive shell is more suitable——

Mr. ISHAM (interposing). It will blow a ship to pieces, while an armor-piercing shell will not do anything.

Mr. SLEMP. Have any of the nations of the earth adopted a shell of the type you speak of?

Mr. ISHAM. No, sir; not for the navy; but in every part of this country there are men who know what they did on land.

Mr. SLEMP. Have any nations adopted it?

Mr. ISHAM. No, sir; neither had they adopted the tank which I urged to be adopted in 1912. But French officers state that whenever the French officers wanted to test out the high-explosive shell they were always met by reports from American officers that such shells were not any good, and that was the reason that they were not prepared to meet the German attacks which nearly won the victory. I want to put that in the record, because I consider that an important part of this hearing.

Mr. SLEMP. You stated a while ago that 275 pounds of high explosives could be carried in a shell.

Mr. ISHAM. Yes, sir; in a 14-inch shell.

Mr. SLEMP. Has such a shell been used anywhere?

Mr. ISHAM. The Germans used T. N. T. in very large shells that produced wonderful results.

Mr. SLEMP (interposing). I did not ask about T. N. T., but I asked about the firing of a high-explosive shell carrying 275 pounds of high explosives.

Mr. ISHAM. The French and other nations use as high as 25 per cent of the weight of the shell for explosive charge.

Mr. SLEMP. How does it happen that you can not get anyone to do it?

Mr. ISHAM. There is opposition to anything that threatens the use of armor plate. Ten years ago I asked to appear before this committee to correct some statements about a test made down the river against armor plate. There was opposition then to hearing me. But Judge Smith, before we started in, took what I considered a very judicial position, that whenever there was any question about a matter of defense or about the statements upon which they were based, it ought to be sifted to the bottom and all witnesses should be heard.

Mr. SLEMP. Well, you have had a hearing.

Mr. ISHAM. I certainly thank you for this.

Mr. SLEMP. You have not answered the question that I wanted you to answer.

Mr. ISHAM. What is that?

Mr. SLEMP. I asked you to give a description of this type of shell as compared with other shells, the cost of manufacturing them, etc. Do you think they could be manufactured in Government plants?

Mr. ISHAM. Yes, sir; that is the place where they should be manufactured. You should not have anything of this sort manufactured in private plants.

Mr. SLEMP. What is the difference between your shell and others? Is it thinner?

Mr. ISHAM. It carries a larger charge of explosive, and has a different way of acting.

Mr. SLEMP. I had reference to its physical appearance.

Mr. ISHAM. Yes, sir; it is different, but it is used with the same propellant that the ordinary shell is used with.

Mr. ANTHONY. I think Mr. Isham has developed his side of the question that the high-explosive shell is more effective under certain conditions than the armor-piercing shell. I think he has brought out his contention, and I think it would be well for the committee to hear statements from the Ordnance and Artillery officers as to the possibility of using that shell.

Mr. SLEMP. I want to ask Mr. Isham one other question: You stated that against the defenses around Leige and Namur they used high-explosive shells, and I want to know if you have made any actual experiments, outside of that on the *Puritan* that you mentioned, or any tests of any kind where the success of your shell was demonstrated in any way?

Mr. ISHAM. Yes, sir.

Mr. SLEMP. Where?

Mr. ISHAM. Wherever a vessel was struck by a torpedo or mine and seriously damaged it showed what effect all those shells would have which struck short—

Mr. SLEMP (interposing). Let me ask the question again: You stated in answer to that question something in regard to torpedoes—

Mr. ISHAM. That demonstrated the correctness of my shell, as my shell is an aerial torpedo. There was never a ship that stood three torpedoes in the whole war.

Mr. ANTHONY. You want to fire a young torpedo through the air!

Mr. ISHAM. Capt. Hobson said that it was the craziest thing on earth to fire torpedoes through the water and not to fire torpedoes from guns through the air. His statements on the floor that the torpedo-shell revolutionized warfare made Germany afraid she would lose the advantage she had secured.

Mr. ANTHONY. A number of years ago they started some experiments with the throwing of dynamite.

Mr. ISHAM. It was not intended to use dynamite. Gelatin was used, because it was the best thing available to make the necessary tests to determine the effect.

Mr. ANTHONY. Do they contain anything about that conspiracy!

Mr. ISHAM. No, sir. May I say in closing that I challenge the proponents and exponents of the armor-piercing shell to a test against a battleship—they to have the first 5 or 10 shots with armor-piercing shells, and may use 16-inch shells; then the same number of 14-inch high-explosive shells are to be fired, the test to be at a range of 15,000 yards and the battleship placed at an angle of 20° to the trajectory.

Mr. ANTHONY. You challenge them to a demonstration, do you?

Mr. ISHAM. Yes, sir; that is all I ask, and I believe the country is entitled to know what is the basis of our national defense. I believe it is a waste of national treasure and that it invites war to have defenses that are based upon a matter in controversy. I respectfully request that this committee urge that such a test be made at an early date against the German battleship which has been allotted to this country for purposes of such tests.

FRIDAY, FEBRUARY 11, 1921.

HIGH-EXPLOSIVE SHELLS.

Mr. SLEMP. Is there somebody present from the Army who would like to make a statement in regard to this matter that has been presented to the committee by Mr. Isham? We will hear you, Gen. Peirce.

STATEMENTS OF BRIG. GEN. WILLIAM S. PEIRCE, ASSISTANT CHIEF OF ORDNANCE, AND MAJ. W. B. HARDIGG, ORDNANCE DEPARTMENT, AND MAJ. S. JARMAN, COAST ARTILLERY.

Gen. PEIRCE. If the committee desires specific replies in detail to the statements advanced by Mr. Isham, I think we should have a little time in order to look up the data, so that the matter can be presented clearly and concisely. As the committee doubtless knows, for 20 years, at least, this subject has been up more or less, and there is quite a long history back of it. We can make a general statement in regard to it now and can answer any general questions, but if there were any specific questions relating to particular experiments and the results obtained from those experiments, we would like to have an opportunity to look up the data.

Mr. ANTHONY. I think a few general statements will be sufficient.

Mr. SLEMP. Our situation is this: We have no estimates from the War Department in regard to this, and the Appropriations Committee does not usually go outside of estimates. We have gone into this matter and investigated it on account of the general possibilities involved, and for the guidance of anybody who might be interested in it. Of course, most of our work here is directed toward the things submitted by the War Department in the form of estimates for money, but since this matter has been taken up, it seems to me that you might answer the statements in a general way, or give us your opinion in regard to the subject. You have heard Mr. Isham's statement. He stated that the shells now being manufactured and that are in contemplation by the United States authorities do not carry a large amount of explosives, or not as large an amount as he thinks they should carry, and that therefore the shells are not as effective as they might be. Now, what is the attitude of the Ordnance Department in regard to the character of shot to be used in the sea-coast defenses in that respect especially? He also emphasizes the effect of high-explosive shells as against vessels without penetra-

tion, and contends that they rather do away with the necessity for armor-piercing shell and the penetration factor.

Gen. PEIRCE. The experience gained from the past war, on top of that of all previous wars, as we understand it, shows that the high-explosive shell, so-called, as distinguished from the armor-piercing projectile, which is the latest design, will not penetrate the armor of modern ships, and its effect therefore is negligible, or, at least, not sufficient. My understanding is that that was the deduction arrived at by the British as a result of the Battle of Jutland, and that it led to the abandonment of the high-explosive shell.

Mr. SLEMP. I do not understand that in the Battle of Jutland there were any explosive shells fired containing any such amount of explosive as 275 pounds.

Gen. PEIRCE. No, sir.

Mr. SLEMP. Have you ever made any test as against the armor plate of vessels with a shell carrying that large an amount of explosive?

Gen. PEIRCE. Not so far as my knowledge goes, not by firing. I think tests have been made by suspending large shells against armor plate.

Mr. SLEMP. Could you with safety fire from a gun a shell containing that amount of explosive?

Gen. PEIRCE. So far as I know that quantity of T. N. T. may be fired, but I would like to ask Maj. Hardigg in regard to that.

Maj. HARDIGG. I believe Mr. Isham took that weight of shell after an interview he had with the office when I was in charge of that work. We pointed out to him what the limitations were, and that a charge of 275 pounds would be very close to 20 per cent of the weight of the total projectile, which we showed him had been used in manufacturing a certain shell, and that certain shells were even in excess of that; so that 275 pounds is his revised estimate of what he could carry in a shell.

Mr. SLEMP. Will you give any results of any tests and experiments that have been made with such shell?

Maj. HARDIGG. Two hundred and seventy-five pounds, being 20 per cent of the weight, is about what was used in a class of high-capacity shell in the field service with mobile guns.

Mr. ANTHONY. By whom?

Maj. HARDIGG. By the French, and to a very limited extent, by the American forces.

Mr. ANTHONY. How did that compare with the shells fired by the Germans in their big 16-inch guns that did so much damage?

Maj. HARDIGG. That is a higher percentage than the Germans fired in their big "Berthas." The shells which were fired at Liège and Namur, to the best of our information, contained slightly less than a 10 per cent charge. Most of those shells have heavy points on them, and were not the point fuse type, which are the highest capacity shell.

Mr. SLEMP. Your experiments in the field do not exactly meet the point that we are driving at here.

Maj. HARDIGG. No, sir; no shell of higher capacity, to the best of our knowledge, have been fired against armor in the attempt to destroy it. We have some information from naval forces. I can not give the

percentage of explosive carried, but they were classed as explosive shell, and, presumably, they must be between 5 and 10 per cent. That data relates to the destruction of the Russian Navy by the Japanese, and it was the finding of our own Navy that had the Japanese used an armor-piercing projectile the fight would have been much shorter, and that they were able to batter some of those ships to pieces by using high explosive shell only on account of their innate superiority and the length of the battle, which permitted them to destroy the Russian ships.

Mr. SLEMP. The type of shell used in the Battle of Jutland was from 5 to 10 per cent also?

Maj. HARDIGG. Yes, sir; the British carried three types of shell. They carried some armor-piercing, some high-explosive, between 5 and 10 per cent, and some not loaded with high explosive.

Mr. SLEMP. What do you personally think of the theory of exploding against a battleship a shell containing 275 pounds of T. N. T.?

Maj. HARDIGG. It can not be compared in results to what we could get from exploding a shell inside.

Mr. SLEMP. If it exploded under the vessel, would it have the effect of lifting the vessel out of the water and punching a hole in her?

Maj. HARDIGG. Yes, sir; there are certain places in the vessel where it would punch a hole and would cause considerable damage, but at other places it would not.

Mr. SLEMP. Has our Navy or the Navy of any country, so far as you know, made any tests of these high-explosive shells as against armor plate?

Maj. HARDIGG. Not to the best of my knowledge, with one exception, on any plate of that class, and that exception was with a shell carrying about 5 pounds of explosive against one of those plates. That test, made on a small scale, would indicate what they would get with a larger quantity. In that case the shell simply made a bulge in the plate and did not perforate it. It did not make a hole in it.

Gen. PEIRCE. I might state here that within the past 25 years a number of experiments along that line have been made, both by the Ordnance Department and by the Navy, and I would suggest that specific data regarding those experiments, showing just what was done and what the results were, be obtained.

Mr. SLEMP. Were the shell containing high explosives that were used by the mobile artillery in France the Isham type of shell, or were they covered by Isham patents or covered by other patents?

Gen. PEIRCE. They were not covered by Isham patents. I am not familiar with all his patents, and will not say anything about that, but so far as I know there was no feature in those shells patented by Isham.

Mr. SLEMP. Then, if the Government has acquired patents which will enable it to manufacture these high-explosive shell, without using his patent—

Maj. HARDIGG (interposing). I do not believe they are subject to any patents. I answered your question regarding any experiments within my own personal knowledge. I have a report here which shows the results of the Gottmann test of high capacity high explosive shell against armor plate.

Mr. ANTHONY. Major, have you gone over the data regarding the hits in the Battle of Jutland?

Maj. HARDIGG. Yes, sir.

Mr. ANTHONY. Do you agree that there was such a large percentage of hits by armor-piercing shell that caused little or no damage?

Maj. HARDIGG. I went over that data about two years ago, so I do not recollect it all, but the principal damage done was done by shells which got inside.

Mr. SLEMP. The criticism that they made was that the shell did not get inside.

Maj. HARDIGG. There were several primary ships in the British Navy which disappeared immediately afterwards, and there was a general understanding that the bursting of shell occurred sufficiently close to the magazines as to cause them to explode.

Mr. SLEMP. They were vessels that did not carry the maximum armor; but they were of the cruiser type.

Maj. HARDIGG. Yes, sir; they were of the cruiser type. None of the battleship type went up in that manner. There is a description by a German naval officer, who was in charge of fire control on a German vessel which was very severely damaged, and which indicates that the principal damage to that vessel had been done by shot which penetrated its turret so as to set fire to the powder in the handling room, wiping out the crew and putting the turrets out of commission.

Mr. ANTHONY. Do you think it is possible to fire these high charges of explosives that you speak of from our coast defense guns at the maximum ranges that you use the armor-piercing shells for?

Maj. HARDIGG. There would not be a very great difference on the possible range which could be obtained.

Mr. ANTHONY. Do you think that it would be possible to explode such shells under the keels of hostile vessels?

Maj. HARDIGG. It would be a very unusual circumstance if you could plant a shell there.

Gen. PEIRCE. It would take an exceedingly high degree of accuracy.

Mr. ANTHONY. Are you in the Ordnance Department?

Maj. HARDIGG. Yes, sir.

Mr. ANTHONY. Of course, the Ordnance Department would not make experiments with a diving shell or anything of that kind?

Maj. HARDIGG. It might, to some extent, for the Army use, as the Ordnance Department handles all the ammunition for the Coast Artillery.

Mr. ANTHONY. Have our military authorities lately held any tests concerning the use of high-explosive shell from our coast defenses?

Maj. HARDIGG. Yes, sir.

Mr. ANTHONY. When was the last one?

Maj. HARDIGG. In January of this year.

Mr. ANTHONY. What was that test?

Maj. HARDIGG. Tests of 12-inch guns and 12-inch mortars against the ex-battleship *Massachusetts*.

Mr. ANTHONY. Where was that held?

Maj. HARDIGG. In Florida, near Pensacola.

Mr. ANTHONY. What charges were fired?

Maj. HARDIGG. There were two classes of ammunition, so-called shot and shell. The mortar shell have a higher capacity than the gun shell.

Mr. ANTHONY. What was the largest charge of explosive fired against the *Massachusetts*?

Maj. HARDIGG. I think about 58 pounds.

Mr. ANTHONY. Why did you not fire shells containing these maximum charges of explosives?

Maj. HARDIGG. There is none available for such use, without making them up, and previous tests have led to the conclusion that they are not a type of ammunition to be used there.

Mr. ANTHONY. Do you think that the Ordnance Department is keeping itself fully abreast all the time of this controversy between armor-piercing and high-explosive shell by means of actual tests?

Maj. HARDIGG. I think we are. We are using all the information that is available in the country, both to the Army and the Navy.

Mr. ANTHONY. Did not the results in Europe show that the use of the high-explosive shell by the Germans created a great deal of damage?

Maj. HARDIGG. If I may answer that question indirectly, the French used the high-capacity shell, the British a lower capacity, and the Germans and Americans the intermediate; so that the high-capacity shells were used more by the Allies than by the Germans.

Mr. ANTHONY. Do you know of any high-capacity explosive shell carrying the maximum charges which we are discussing having been fired from any of the coast-defense guns for experimental purposes in recent years?

Maj. HARDIGG. Yes, sir; at land targets, however.

Mr. ANTHONY. Any at sea targets?

Maj. HARDIGG. No, sir.

Mr. ANTHONY. Where used on land targets?

Maj. HARDIGG. For land uses we furnish a higher-capacity shell than is used in ordinary target practice at the present time.

Mr. ANTHONY. There is no question but what our Army has kept fully abreast of the development of the high-explosive shell for field use?

Maj. HARDIGG. None whatsoever.

Mr. ANTHONY. But is there not apparently an entire lack of its use for coast-defense purposes?

Maj. HARDIGG. I do not think there is; but I should like to ask Maj. Jarman, who represents the Coast Artillery, to give you an opinion on that.

Mr. ANTHONY. I think that would be proper.

Maj. JARMAN. I should like to preface my remarks by going back in history a little bit and then coming up. In the case of mortar projectiles, we used a torpedo shell that was to attack the decks of ships. I have forgotten the capacity of that shell, but it was of a very large percentage. Then the next type used was what we call a deck-piercing shell, which was strong enough to pierce the decks of battleships that were constructed.

The decks of the ships continued to be made thicker and thicker and finally we got to the point where the torpedo shell would not penetrate it at all. The exploding of these torpedo shell on the upper structure of the deck will not put a capital ship out of action. The

type of shell that functions in accordance with the principle that Mr. Isham contends for was cast aside 10 years ago. I may be a little wrong as to my dates, but quite some time in the past. Then we went to what is called the deck-piercing shell which proved very successful in the Pensacola firing. They gave good results, because we fired them against a battleship which was constructed in 1893.

Mr. ANTHONY. In the tests against the *Massachusetts* at Pensacola, did you try to fire a high-explosive shell at her with the idea of hitting her under water or exploding under the keel?

Maj. JARMAN. No, sir; because they had done that with the *Indiana* and there was no reason for that.

Mr. ANTHONY. Did they fire any such shell at the *Indiana*?

Maj. JARMAN. It has been suggested here that they did not.

Mr. ANTHONY. You think they did not?

Maj. JARMAN. But they exploded bombs which were to give the same kind of effect.

Mr. ANTHONY. Why does not the Coast Artillery fire these charges of high explosives from its guns to demonstrate whether or not they can explode them under the keels of ships?

Mr. SLEMP. If I understand that is practically the only place that a high-explosive shell will have any effect at all.

Mr. ANTHONY. I think that is admitted. Gen. Mitchell contended here that a charge of high explosive on the deck of a ship would sink the ship, and he said that the experiment with the *Indiana* demonstrated that there would be a tremendous amount of damage done by an explosion of that kind.

Mr. SLEMP. Gen. Mitchell's testimony at another place was that they had secured some kind of a material that eats its way through the deck of the vessel and then explodes inside.

Maj. HARDIGG. Thermite, probably.

Maj. JARMAN. This shooting, as we see it now—that is, the firing at ships—is going to be at a long range. We are building guns to fire at long range and up to an elevation of 45 degrees or more, and a projectile coming down at that angle is not going to slide under the hull of the ship, it will come down 60 or 65 degrees, pretty nearly vertical.

To get back to what you have in mind, to get one projectile close enough to hit that portion of the ship where it will do some damage. I would say that we have to go through the armored deck: we have to have a fuse that will let us go through and to explode down inside the ship. There should be a certain amount of delay incurred there after it hits something. Any fuse which would allow the projectile of the kind Mr. Isham speaks of to explode underneath would go so far down that when it did explode I do not believe that it would do any damage to the ship.

Mr. ANTHONY. In other words, at long range, when the projectile hits the water it goes down at a sharp angle and would be very apt to miss the bottom of the ship?

Maj. JARMAN. We are now using long-range guns.

Mr. ANTHONY. How about this so-called diving shell, this nose that can be put on a shell so that it will strike several hundred feet short of the battleship and will then flatten out and hit the ship?

Maj. JARMAN. I am not familiar with the diving shell.

Gen. PEIRCE. As I gathered from Mr. Isham's testimony, he stated that the effect of this diving nose was to continue the course of the projectile or to make continuous its trajectory. I did not understand that it would flatten out.

Mr. ANTHONY. I got that impression.

Maj. HARDRIGG. The difficulty with the flat-nose shell is, if fired without a wind shield that goes over the nose it has a very remarkably reduced range. His claim was that if it were necessary he could cover up the nose of the shell with something that would collapse on water impact, then the diving shell would go as if fired without its nose. In other words, he put what is known as a ballistic cap on his shell.

Maj. JARMAN. At long ranges, wherever the range is over about 15,000 yards for the 16-inch guns, the angle of fall is such that they are going to continue in the water: they will not ricochet; they will go down.

Mr. ANTHONY. Do the Coast Artillery people contemplate holding any further tests involving the use of the high-explosive shell, or do you consider it a closed incident?

Maj. JARMAN. We do not feel that there is any use of it; absolutely none at all. Our idea is to hit the ship, go inside of it, and put it out of action.

Mr. ANTHONY. I know; but there is another class who feels that an equally good way to get rid of a ship is to explode the shell with high explosive in the proximity of the vessel. Does the Coast Artillery plan to attempt anything of that kind?

Maj. JARMAN. We have no plans for it; we have no projectiles constructed.

Mr. ANTHONY. Would it be possible for the Coast Artillery to carry out an experiment of that kind?

Maj. JARMAN. If somebody will furnish the ship and some ammunition is built we will use it; yes, sir.

Mr. ANTHONY. Can not you do it in connection with some of the naval tests? For instance, after they get through battering up a ship, if it is not completely sunk, tie it in front of some of your fortifications and see what you can do. Personally I think there is a little ground for contention, and I should like to see some practical demonstration of the question. I think some other Members of Congress would.

Gen. PEIRCE. I want to make one thing clear, that the desire of the Ordnance Department, and, I am sure, also of the Coast Artillery, is to get ammunition that is most effective for the purpose, regardless of the source from which it comes, and there is certainly no desire or no intent on the part of either service to disregard any suggestion that offers any promise; but you must remember that we have a very large past experience in the result of experiments; that these things come up and have come up periodically and have been tried out, and therefore we are in a position, in many instances, to say when a new proposition comes up this, we know from past experience, is not efficient, it is not practical, there is no need of spending further money on it.

As I said before, there have been a very considerable number of experiments made on just this point by both the Navy and the Ordnance Department. I can not say offhand that precisely the type of experiment that you speak of has been made, but I am confident that

projectiles containing a very large percentage of charges have been placed in actual juxtaposition to the plates and there exploded and the effect on the plates observed. I think that you can deduce from these experiments just as reliable results as you could if the projectile had been fired from the gun.

Mr. ANTHONY. From the standpoint of this committee, it has evidence brought to it to show that our coast defense relies entirely upon the armor-piercing shell for protection or offense against hostile ships. It has also evidence presented to it that a charge of explosives, which you admit it is possible to carry in a shell for the coast-defense guns, if placed within 50 feet of the keel of a ship will sink it, and we also have evidence which shows that armor-piercing shells hitting a vessel failed to sink it. That is the reason why the committee is a little anxious to know whether our Ordnance Department and our Coast Artillery are keeping up to date.

Gen. PEIRCE. I feel that we want to satisfy that entirely. I agree with you. It is a subject that there should not be left any doubt about whatever. We will be very glad to submit the results of the experiments which have been made so far, and if the committee does not regard those as conclusive we are at all times open to the suggestion of making further experiments. I might add that there is not only the question of the amount of explosive and the distance, but the question of getting it to go off at the time, which involves the fuse action.

Mr. ANTHONY. I understand that.

Maj. JARMAN. I should like to add another thing. Our problem in this case is the same as the Navy's. They have spent a great deal of time following up these various experiments that Mr. Isham has referred to. There is a very long report, I think, on the Navy experiments along this line, and they have a good deal of data on the subject. I think they should be called upon to give their opinion on the same subject.

Gen. PEIRCE. I was going to ask would the committee call upon both the Ordnance Department of the Army and of the Navy for such information regarding its tests of this character which have been made?

Mr. ANTHONY. Have you that available?

Gen. PEIRCE. We could get it up very quickly, as far as we are concerned.

Mr. ANTHONY. If it can be gotten up without any great amount of labor, I think the members of the committee would be very glad to have it for their own information.

Maj. JARMAN. I think that the Navy should be called upon to furnish their own information.

Gen. PEIRCE. I included the Navy in my suggestion.

Mr. ANTHONY. Personally, I do not think that the recent tests of the Navy have been very successful. I was very much disappointed to find that in the test with the *Indiana* they did not fire any high explosive from the guns; it was placed on the decks of the ship.

Gen. PEIRCE. I think, however, we could conclude this, if the explosive was placed on a ship and the shell does not produce an effectual result, then it is idle to go on and try to put it there by firing. If we suspend a shell next to a plate and find that the results are satis-

factory, then would come as the next step the attempt to do it by means of a gun.

Mr. ANTHONY. I see.

Gen. PEIRCE. But until you find out whether it is worth while to get it there by means of a gun, it has been thought that it was hardly worth the money that it would cost to attempt to do it that way.

THURSDAY, FEBRUARY 10, 1921.

**STATEMENT OF HON. JOHN F. MILLER, A REPRESENTATIVE IN
CONGRESS FROM THE STATE OF WASHINGTON.**

FORTIFICATIONS ON PACIFIC COAST.

Mr. SLEMP. Gentlemen of the committee, we have with us Congressman John F. Miller, of the State of Washington. We always feel honored when another Member of the House has a statement to make to the committee, and we give you *carte blanche*, Mr. Miller.

Mr. MILLER. Mr. Chairman and gentlemen, I wanted to take up with you briefly, as I may, the Pacific coast conditions from the angle of fortifications. In order to get a comprehensive idea of the Pacific coast, there must, essentially, as a preface to the matter, be a reference to the condition of affairs on the Atlantic coast. I take it from the general system of coordinated defenses and fortifications on the Atlantic coast between the Army and the Navy that there are four major exposed areas. Those are all within a comparatively small mileage distance. Those major areas are, of course, Boston, New York, the Delaware, and the Chesapeake. The others are secondary exposures. On the Atlantic coast it so occurs that New York is approximately the mileage center of these major exposed areas. At each of these areas the land fortifications are now adequate, so they can probably be self-sustaining.

Mr. SLEMP. You mean it is just a question of maintenance?

Mr. MILLER. Yes; of course, in case of emergency; strengthened by the mobile artillery.

Mr. SLEMP. The War Department has asked for a very few larger guns.

Mr. MILLER. We have quite a large number on hand.

Mr. SLEMP. But no money is being appropriated this year for any new construction of large guns.

Mr. MILLER. Out on the Pacific, of course, we have only 3 States, as compared with 15 on the Atlantic, and a coast line that probably stands in proportion as about minus 5 does to plus 7. We have likewise on the Pacific, as I see it, four major exposures; but it is the expanse of distance on the Pacific that makes a coordinated defense very difficult. In other words, the Straits of Fuca constitute the entrance to Puget Sound, and a ship in making the sea from Puget Sound passes within 4 miles of British territory on the north. San Diego is 18 miles from the Mexican frontier. There is not that compactness of exposures on the Pacific that there is on the Atlantic.

Mr. EAGAN. What is the distance from Puget Sound to San Diego?

Mr. MILLER. Figured in nautical or land miles?

Mr. EAGAN. Land miles, for instance.

Mr. MILLER. I do not know. I have never seen any accurate figures. Even the hydrographic reports do not give the accurate mileage.

Mr. EAGAN. Approximately.

Mr. MILLER. Approximately 1,300 miles.

Mr. EAGAN. And from the Chesapeake up to Boston?

Mr. MILLER. Between 600 and 700 miles. On the Atlantic seaboard these exposed areas are so arranged, as I understand the general plan of defense, as to leave the Atlantic Fleet in one unit free to protect the master exposed area which is New York City, of course, or free to meet an invading fleet or an approaching fleet at any objective they may select. On the Pacific coast we are not situated in that way and that is the weakness of our position. Those of us who live on the Pacific coast know what is taking place across the Pacific. There is where the saber is rattling and we are 3,000 miles nearer where the saber is rattling than we are here.

There are a number of Japanese steamship lines that run into the city of Seattle particularly. I have no hesitancy in speaking about it. There are four Japanese newspapers published in my town. There are three large banks there that are Japanese banks. There are about 20,000 Japanese in that city. They have recently bought up about 58 per cent of all the hotels in the city, big, little, and great. They control 183 retail groceries in the city. They are beating in at every place where a white man will let loose. They control the markets on produce. There is where the trouble is coming from and that is what is waking us up on the Pacific coast, and that leads to the alarming condition on the Pacific coast in our defenses, and I want to make some suggestions to you gentlemen with a view to embodying in this bill a survey of certain locations, which I will describe to you, to get an idea of their practicability for military uses.

SAN DIEGO, CALIF.

Now, starting from the south and working up the Pacific coast, you come to San Diego, which is a beautiful city of about 74,000 people. It is not a war-producing community, and there are no war necessities produced at San Diego. It is connected with a single line of railroad and two highways leading to the north. To the south is the Mexican line, about 18 miles distant, and to the east is the Elkhorn Valley, which is a highly productive region. To the north is the only possible use that could be made of local forces, and the topography of the land is such that it has too many highly effective defensive positions to be overcome.

Mr. EAGAN. How far is Magdalena Bay from there?

Mr. MILLER. Magdalena Bay is in the Gulf of California, in Mexican territory. No belligerent, except where there is a military necessity for such destruction, resorts to the destruction of private property, and nobody ever advocated that sort of destruction except the Germans or those of the German school of operations. Therefore, for the present San Diego is what you might call a secondary

exposure, and there is no possibility in these days, in the serious and intense game of war, of an enemy expending its energy in operations against any point unless there is a great gain to be had from the military viewpoint. Therefore, that eliminates San Diego.

LOS ANGELES, CALIF.

Going north from San Diego, the next exposure is San Pedro, the port of Los Angeles. San Pedro is protected now with some very creditable fortifications in that vicinity. Eighteen miles south by west of San Pedro is the northwest part of Santa Catalina Island. This is an island about $18\frac{1}{2}$ miles long, with a width of 7 miles at its widest place. There are two curiously converging coves from the east to west that divide the island into two elevations, north and south. The south one obtains a height of over 2,100 feet and the north one of over 1,700 feet. Approximately one-eighth of the island is north of this isthmus. The 20-fathom line, according to the hydrographic report, extends within 1 mile of the shore on the southern part of the island.

The north part of the island is a very dangerous coast, and every chart abounds in nautical warnings. It occurs to me that if that part of Santa Catalina Island north of the Isthmus were provided with suitable fortifications, it would make San Pedro Harbor absolutely impregnable and absolutely safe without the presence there of any substantial naval units in case of emergency. All that I am working around for now is to get a unified fleet on the Pacific, just the same as there is on the Atlantic, which, according to every observation, is the major defensive plan for the country.

Mr. FRENCH. Has that project been surveyed?

Mr. MILLER. Never has anything been done in regard to it. I have suggested it to the Chief of Coast Artillery, and I have been over a good deal of their artillery stock. Of course, I am a layman, and I am not an expert in these things, but the modern defense, as we all know, is the mobile defense. The World War has taught that lesson to us. Even so formidable fortifications as those of the Brailmont type, forming the defenses of Leige, the Belgian defenses, and those of Verdun, all went down in a crash. All the fortifications, both at Point Loma and at San Pedro, are of the open-battery type. On the northern coast of Santa Catalina, or around to the north and northwest, the country is very rocky.

That island lies east-southeast, and west. It is a rocky island. It is a landfall from the sea of at least 50 miles. By coordinating the fire with that from the present mainland fortification at San Pedro, it would necessarily expose a ship to both a longitudinal and transverse fire in any operations against the defenses of San Pedro, and there is no man of the sea who would not rather go up against hell itself than a simultaneous transverse and longitudinal fire.

Mr. FRENCH. How far is that island from the shore?

Mr. MILLER. It is about 18 miles south by west. The channel there is very marked in the approach to San Diego, and it appears to be within 7 or 8 miles of the defenses. Now, if you take a modern 16-inch gun, of which we have some. It has a range of about 32 miles.

The best test that I know of is to double the caliber miles—that is to say, a 16-inch gun will throw a projectile 30 miles and a 3-inch gun will throw it 6 miles. That is the common 3-inch gun, and that is about the way it runs. Therefore you would see that in any operation against San Pedro the vessel would necessarily come within the most deadly range of any defense on Santa Catalina Island.

Los Angeles is a very strategic point. It is a producer of war necessities, and that is always an incentive for enemy operations. It has oil right in the city limits, and the local wealth there is great. The industrial plants would constitute a valuable asset, or an asset of sufficient value to make it the objective of an enemy. At San Pedro or Los Angeles you find really the first primary exposure on the Pacific coast, as I look at it: A system of fortifications on the northern or northwest part of the island, although that is a matter of military engineering, would make San Pedro absolutely impregnable from the sea. Unhappily the background of Los Angeles is not as effective as it is at San Diego. There is not a strong defensive position in the back country. The railheads at Los Angeles are very valuable from the strategic standpoint. The Santa Fe and the Southern Pacific both run in there, and the Santa Fe goes on south. The only thing I am asking for is a survey and report on the practicability of fortifications on Santa Catalina Island and an additional defense for San Pedro.

SAN FRANCISCO, CALIF.

Now, we pass on north to San Francisco: There are 1,000,000 people living on San Francisco Bay. Twenty-three miles due west of the entrance to Golden Gate are the Farallone Islands. About 12 miles, or perhaps a little farther beyond the 4-fathom line, and back outside of the Gate, are those rocky, desolate islands—probably the most desolate islands on the coast. It is a group of islands, and this group, like all the other groups, run east—southeast, and west—northwest. The group consists of three islands, the Southeast Farallones, the Middle Farallones, and the Northwest Farallones. This series of islands are probably 9½ miles long. The Southeast Farallones is the island that is due west of the Gate.

Mr. SLEMP. Did you say they were 24 miles out?

Mr. MILLER. They are 23 miles out. That island has an elevation of 341 feet where the lighthouse now stands. It is a rocky, desolate island, and, like Santa Catalina, any vessel in operation against the defense at the entrance of the Gate would naturally be exposed to a transverse or a longitudinal fire from the Farallones. That island is about seven-eighths of a mile long and five-eighths of a mile wide, and it is a landfall for perhaps 30 miles from the sea. I believe the report shows 341 feet elevation. With that island fortified, there is no vessel in this world, fleet, or combination of vessels, that could make the Golden Gate, and San Francisco would be as safe as Omaha from attack from the sea.

All that we have to do is to take the analogy of Helgoland, which is 36 miles out in the North Sea, off the mouth of the Elbe, and 32 miles from the mouth of the Weser, and all during the World War Hamburg, up the Elbe, and Bremen, up the Weser, were absolutely

safe from attack from the sea. Now, this four-fathom bar runs in a horseshoe shape outside of the Gate. They call it a 4-fathom bar, and it has a covering of about $4\frac{1}{2}$ fathoms of water, or about 25 feet or $26\frac{1}{2}$ feet, and therefore no big vessel can make San Francisco unless it comes in on full tide and a smooth sea. Now, San Francisco is a wonderfully strategic point. It is great rail head. The great oil fields of the State feed right into San Francisco and Oakland. There you will find facilities for oiling and fueling all kinds of vessels. There is an arsenal near there at Benecia, the only arsenal west of the Mississippi River.

There are great grain elevators, industrial plants, and great explosive works, all of which make it a highly strategical point. As I look at it, unless there is something involved that an ordinary layman can not observe, San Francisco can be made absolutely impregnable to approach from the sea by proper fortifications on the Farallone Islands. It can be made as much more so as San Pedro can be by fortifications on Santa Catalina Island. Going to the north, and passing the mouth of the Columbia River as of secondary exposure and easily protected, we get to the Strait of Juan de Fuca, and there you will find the greatest exposure on the Pacific coast. The next naval battle off the west coast, if another is fought, will in all probability be the Battle of the Straits of Fuca. That is as sure as the future comes to pass. The Straits of Fuca is a stretch of water of 83 miles, straight away. The entrance to the Straits of Fuca is 12 miles wide, with Cape Bonilla on the north and Cape Flattery on the south. There are no islands off the entrance, but it is open sea. As I said, there is a straight-away of 83 miles. For the first 42 miles the width is 11 miles. Then it narrows down for 5 miles and a half and to a width of 8 miles.

Mr. SLEMP. Is that what is known as Puget Sound?

Mr. MILLER. No, sir; I will come to Puget Sound later. That is the Strait of de Fuca, which is on the boundary between the United States and Canada. Puget Sound proper is all within the United States. This stretch of water again expands, and for a distance of 30 miles it has a width of from 18 to 20 miles, extending into what is known as the Gulf of Georgia. Now, there is not a gun on that great expanse of water—not one on earth. There is not a bar or rock or a shoal in this great expanse of water.

Mr. SLEMP. What cities or towns are on this stretch of water?

Mr. MILLER. Port Angeles is about the only one I know of. That is a city of 10,000 people. There the strait is 11 or 12 miles wide, and Victoria is right opposite Port Angeles.

Mr. SLEMP. Does that strait enter the Sound?

PUGET SOUND.

Mr. MILLER. Yes, sir. The strait proper terminates at what is called Whidby Island, where it pinches into the narrows about $3\frac{1}{2}$ miles wide, on a slight curve, known as Admiralty Inlet. That is the entrance to Puget Sound. Everything south of that is Puget Sound. Puget Sound has a coast line of over 1,200 miles, and it would strike one who viewed it as a gigantic network of navigable channels and canals. Now, Puget Sound is a railroad for every transcontinental line, either Canadian or American, with the exception of two.

Mr. SLEMP. Is that Seattle?

Mr. MILLER. Yes, sir; Seattle and Tacoma. Every transcontinental line in America and Canada has a railhead on Puget Sound, except two, and those two are the Southern Pacific and the Santa Fe.

Mr. SLEMP. How wide is the strait? Did you say it was 3 miles wide where it enters the sound?

Mr. MILLER. About $3\frac{1}{2}$ miles.

Mr. SLEMP. How deep is it?

Mr. MILLER. Very deep in the channels; 150 fathoms. The 10-fathom line runs into the shore at some places. There is a system of forts there, consisting of three forts, and I have been over them many times.

Mr. SLEMP. Are they at the entrance?

Mr. MILLER. At the entrance of Admiralty Inlet.

Mr. SLEMP. There are three forts there?

Mr. MILLER. Yes, sir; Fort Flagler, Fort Worden, and Fort Casey. One of these forts is on Whidby Island and two are on the mainland. Whidby Island is American territory.

Mr. SLEMP. You say there is a fort on this island?

Mr. MILLER. Yes, sir.

Mr. SLEMP. How far is that from Seattle?

Mr. MILLER. About 60 miles.

Mr. SLEMP. I think that is important, from Seattle down to the strait.

Mr. MILLER. To the strait is only about 50 miles.

Mr. SLEMP. I think it was stated in our hearings that it was 80 miles from Seattle down to the strait.

Mr. MILLER. No, sir. It is 83 miles down to Cape Bonilla and Cape Flattery from Whidby Island.

Mr. SLEMP. What is your suggestion about this?

Mr. MILLER. My suggestion is this: That a survey and report on the practicability of the fortification of the Farallone Islands off San Francisco and Santa Catalina Island off San Pedro be made. If you have those places absolutely secure in case of emergency the fleet would be left free to operate as one unit on the Pacific coast, as it now operates on the Atlantic.

Mr. SLEMP. In regard to Puget Sound, I think it is the attitude of the War Department to strengthen the defenses there. Now, there are two methods of doing it: One is to put guns on railroad mounts and the other is to put emplacements there for large guns, or for 16-inch guns.

Mr. MILLER. I think the largest guns there now are 10-inch guns.

Mr. SLEMP. I think there are some 12-inch guns there.

Maj. BROWNE. Fort Worden has two and Fort Flagler has two.

Mr. MILLER. When were those guns placed there?

Maj. BROWNE. Perhaps 20 years ago.

Mr. MILLER. They were placed there at the close of the Spanish War.

Mr. SLEMP. As a hangover from the war there are being completed now forty-two 14-inch guns, and a great many of them will be completed within the next two fiscal years.

Mr. MILLER. I was going over that with Gen. Coe the other day.

Mr. SLEMP. Within the next two fiscal years I think that all of those forty-two 14-inch guns will be completed, and we are carrying

some appropriations for 14-inch gun carriages. Now, the type of the 14-inch gun carriage has not been positively settled, and it is rather in the experimental stage.

Mr. MILLER. Those are mobile mounts?

Mr. SLEMP. Yes, sir. The method is to run them on railroad trains. At one side of the train is a block on which to run the gun. Within the next year or so there will be quite a number of them available for distribution. Last year the estimate of appropriation provided for 16-inch guns.

Mr. MILLER. Are they being built near Boston?

Mr. SLEMP. At Watertown. All of them are finished at Watertown, but most of the forgings are made at other places.

Mr. MILLER. That is not a mobile gun.

Mr. SLEMP. No; it is on fixed emplacements.

ALASKA.

Mr. MILLER. Gentlemen, right north of the Straits of Fuca is Vancouver Island, British territory, and north of Vancouver Island is the great Alaskan Archipelago. There are over 2,000 charted islands. There is no such series of islands existing between Point Barrow and the Horn as the Alaskan Archipelago. They extend for about 200 miles north and south and probably 100 miles east and west. Some of the islands are not bigger than this building. Navigable channels cross and criss cross, as is shown on the charts which I have here. I think there is a wireless or cable station at Sitka, on the extreme west of the islands. I think there is only one or two stations on these 2,000 islands.

Alaska has the greatest gold mines on earth to-day. We have \$40,000,000 invested in southeastern Alaska in a railroad that leads directly to the sources of supply of copper and gold, which, as we all know, are military necessities. As to coal, they are just getting under production or about to. There are enormous coal fields and fishing industries of the most valuable kind, the manufacture of nitrate, fish nitrate, oils, fish oils, and salt canning plants, etc. Then, of course, over and above that are the copper deposits and these immense gold mines. There is not a gun on the 26,000 miles of coast line of Alaska, not one gun. There are some storm-beaten revenue cutters which run up and down there, and every time one is late making port the skipper usually excuses himself by saying "the belt slipped." By referring to the map of the entire coast the Straits of Fuca, as near as it can be ascertained, is the mileage center of the exposed areas. On Puget Sound is found the only coal produced on the Pacific coast or which has been produced outside of Alaska. There are coal mines in the British territory. The supply of coal on Puget Sound, outside of all other things, is sufficient to mark it as the first and supreme objective from the sea by an enemy. We all know that any enemy coming to the Pacific coast must come far from its base of fuel supply.

Mr. SLEMP. How does the population of the Japanese out there increase; it seems to increase beyond the normal rate of animal production?

Mr. MILLER. The birth rate is very high.

Mr. FRENCH. And then she can send for her parents?

Mr. MILLER. She can send for everybody. There is no Japanese vessel which comes to Seattle but what there are from 6 to 25 desertions. After they have remained in this country three years we can not inquire into them. In many of our country schools the preponderance of attendants is Japanese children.

Mr. SLEMP. Of course, that feature might be taken care of through the immigration law?

Mr. MILLER. That is something which your committee can not handle. There are 17,000 in Seattle. Of course, all the serious relation with Japan has come up through its colonization of the Pacific coast. We have a constitutional provision against the alien ownership of real estate in our State and have always had, but the Japanese get around it in one way and another in many instances.

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